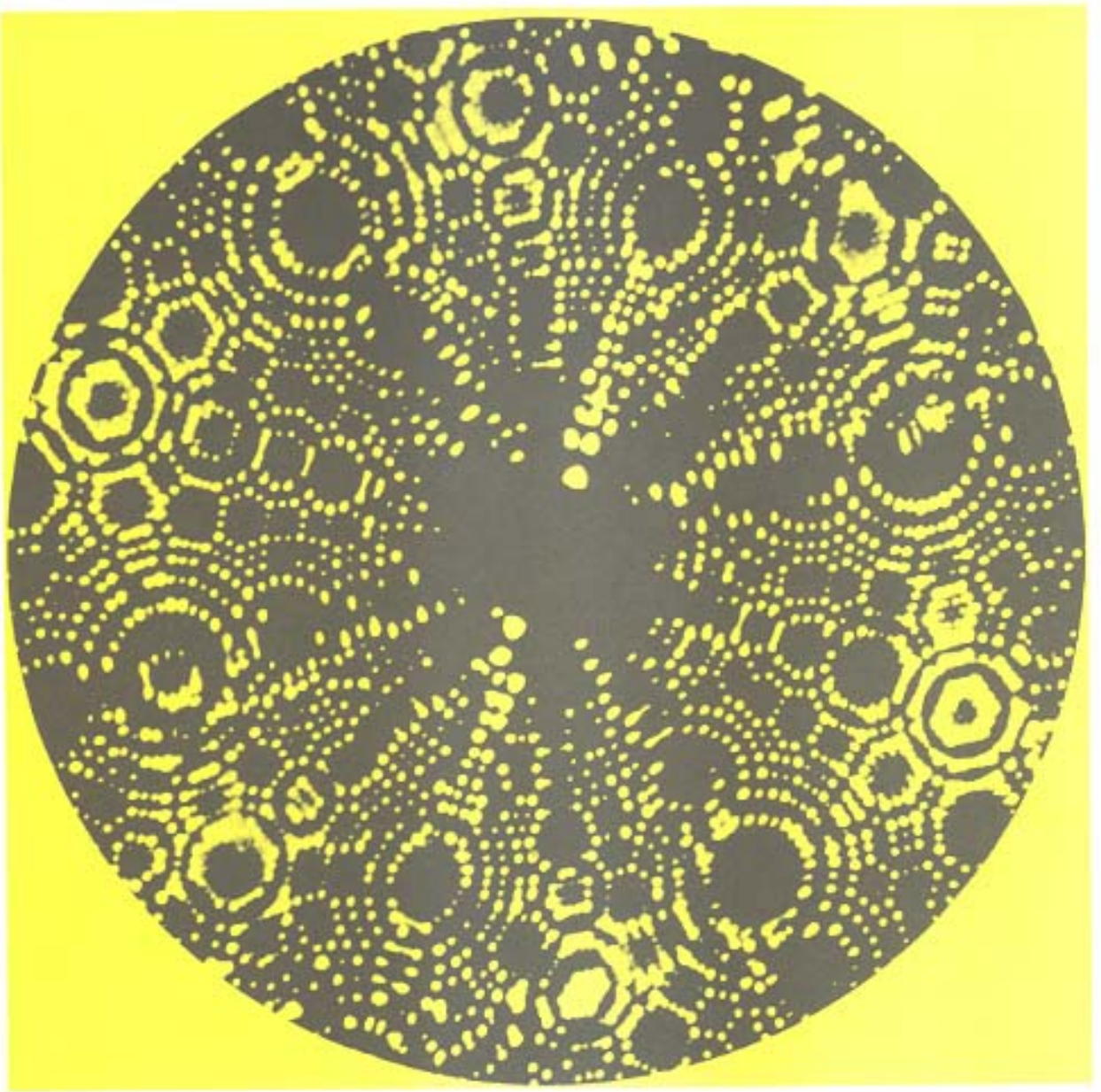
No. 51

Unesco Science and Technology Activities in Asia and the Pacific

Science policy studies and documents



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Unesco Science and Technology Activities in Asia and the Pacific

Unesco

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Preface

The Unesco series 'Science policy studies and documents' forms part of a programme initiated by the General Conference of Unesco at its eleventh session in 1960, which aims at making available factual information concerning the science and technology policies of various Member States of the Organization as well as technical studies of interest to policy-makers and managers.

The country studies are carried out by the government authorities responsible for policy-making in the field of science and technology in the Member States concerned.

The selection of the countries in which studies on the national science and technology policy are undertaken is made in accordance with the following criteria: the originality of the methods used in the planning and execution of such policy, the extent of the practical experience acquired, and the level of economic and social development attained. The geographical coverage of the studies published in the series is also taken into account.

The technical studies cover planning of science and technology policy, organization and administration of scientific and technological research, and other questions relating to science and technology policy.

This same series also includes reports of international meetings on science and technology policy convened by Unesco.

As a general rule, the country studies are published in one language only, either English, French or Spanish, whereas some of the technical studies and the reports of meetings are published in several official languages of the Organization.

The present publication describes briefly the activities carried out by Unesco in the field of science and technology in Asia and the Pacific. As a rule mention is made only of the most significant current activities carried out or planned by the Organization in 1981-1983. The activities described are those carried out by the eight specialized Programme Divisions of the Science Sector of the Organization, working in close co-operation with the operational Division of the same sector; a Division of Science, Technical and Vocational Education of the Education Sector; the operational Division of the same Sector; a Division for International Statistics on Science and Technology; a Division of the General Information Programme and the two Unesco Regional Offices for Science and Technology for Southeast Asia and for South and Central Asia.

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Introduction

A. Principles of action

Unesco is the Specialized Agency of the United Nations entrusted with the international promotion of education, science, culture and communication with a view to furthering peace among nations and enhancing the well-being of all peoples of the world. This objective of furthering peace and development gives Unesco's action both an *ethical* and a *practical* dimension which are characteristic of programmes carried out by the Organization.

In the execution of its tasks, Unesco works in two main ways: encouraging *intellectual co-operation* and developing *operational projects*. Intellectual co-operation is fostered through programmes concerning the promotion of ideas and the advancement of knowledge in the fields falling within Unesco's constitutional responsibilities. This is done mainly by conducting international co-operative research projects, by organizing international conferences and seminars, and by issuing publications. The operations function is essentially performed through the so-called technical assistance programmes of the Organization.

Furthermore, Unesco's activities in the various regions of the world have as their primary purpose that of giving the countries concerned in those regions the benefit of the worldwide experience adquired by the Organization in the areas of education, science and culture while also helping them to solve their related problems. Seen from this angle, activities at world, regional and national level are complementary and mutually supportive. They reflect one aspect of mankind's organized effort towards peaceful coexistence, mutual assistance and intellectual co-operation.

B. Organizational structure

At the present time, Unesco's activities concerning science and technology are primarily the responsibility of eight programme divisions belonging to the Science Sector of the Organization. Working in close co-operation with these programme divisions is a special division responsible for implementing "operational" projects, and a division for international statistics on science and technology. Finally, the Regional Office for Science and Technology for South and Central Asia, located in New Delhi, India, and the Regional Office for Science and Technology for Southeast Asia, with its Headquarters in Jakarta, Indonesia, co-operate closely with these various units at Headquarters and provide them with the necessary support.

C. Aims and scope of this report

This report gives a brief description of Unesco's activities in Asia and the Pacific in the field of science and technology (excluding social sciences). For the sake of brevity, and as a rule, mention is made only of the most important and significant activities carried out or planned for 1981-1983.

The report covers the activities of (1) the eight programme divisions of the Science Sector, of its Operational Division and of its two Asian field offices: the Regional Office for Science and Technology for South and Central Asia (ROSTSCA, New Delhi) and the Regional Office for Science and Technology for Southeast Asia (ROSTSEA, Jakarta); (2) the Division of Science, Technical and Vocational Education of the Education Sector and of this Sector's Operational Division; (3) the General Information Programme Division (Scientific and Technological Information); and (4) the Division of Statistics on Science and Technology of the Office of Statistics.

D. Structure of this report

Part I of the report gives a synopsis of activities according to three levels: world, regional and national. Part II contains a description of activities by subject. For each programme activity entry, the information appears under a number of headings according to Table I:

Table I - Types of information provided for each activity

HEADINGS	WORLD	REGIONAL	NATIONAL
Title (and acronym if any) of the activity/programme/project	*	*	*
Brief description (if necessary)	-	-	*
Principles of action	*	-	-
Main aims (short or long term)	*	*	*
Specific activities (current or planned for 1981-1983)	* (at world, regional or national level)	* (at regional and national level)	*
Achievements (and work in hand; indicating whether significant results have already been obtained)	*	*	*
References	-	-	* (No. of UNDP project)
Linkages (if any) with other activities	*	*	*
Background information (origins, date of launching, duration, etc.)	*	*	*
Organization(s) responsible if other than Unesco)	*	*	*
Organizational machinery (responsible for planning/co-ordination/implementation)	*	*	*
Participants (if other than all the Member States of Unesco	* (countries and organizations)	* (countries and organizations)	-

* = Data given
\- = No data

Part I
SYNOPSIS OF ACTIVITIES

1. ACTIVITIES OF WORLDWIDE SCOPE

Through its worldwide programmes, Unesco aims at combining the efforts of all its Member States towards the achievement of common goals. The participation of Asian and Pacific countries in these worldwide programmes is of particular importance in view of the geographical sweep and huge population of the region, as well as in view of the very significant scientific capabilities attained by a number of countries in that part of the world. These countries have both a lot to give and a lot to gain as far as interaction and co-operation with other Member States within or outside the region is concerned.

It should be stressed that the Secretariat of Unesco never loses sight of the need to associate *all* Member States as closely as possible with the activities undertaken by the Organization as part of its worldwide scientific and technological programmes.

2. ACTIVITIES OF A REGIONAL NATURE

(a) Role of the Regional Offices for Science and Technology in Asia and the Pacific

Unesco's science and technology regional programmmes in Asia and the Pacific are implemented mainly through the following two field offices:

(i) Regional Office for Science and Technology for South and Central Asia (ROSTSCA) in New Delhi, India. This office serves the following countries: Afghanistan, Bangladesh, Burma, India, Iran, Maldives, Mongolia, Nepal, Pakistan and Sri Lanka;

(ii) Regional Office for Science and Technology for Southeast Asia (ROSTSEA) in Jakarta, Indonesia. This office serves the following Member States: Australia, China, Democratic Kampuchea, Democratic People's Republic of Korea, Indonesia, Japan, Democratic People's Republic of Lao, Malaysia, New Zealand, Papua New Guinea, the Philippines, Republic of Korea, Samoa, Singapore, Socialist Republic of Viet Nam, Thailand, Tonga and the territory of Hong Kong.

These two regional offices, the responsibilities and capacity for action of which are now being strengthened in accordance with Unesco's decentralization policy, have the task of encouraging, preparing, carrying out and supervising Unesco's regional programmes in the scientific and technological field, whether financed under the regular programmme or under the United Nations Development Programme. At the request of the programme divisions concerned, they also assist Headquarters' specialists in undertaking national programmes and bringing them to a successful conclusion.

The two regional offices assume the following general functions:

(i) *regional programmes:* participation in the preparation, planning, execution and evaluation of the Organization's regional programmes in science and technology, whether financed under the regular programme or from extrabudgetary sources;

(ii) *advisory services:* in liaison with Headquarters, regional offices provide advisory services to Member States, at their request, on scientific and technological matters of a national character. With this end in view, the regional offices maintain contact and collaborate with the national authorities responsible for policy-making in science and technology;

(iii) *training of personnel:* in collaboration with Headquarters, regional offices organize training courses, symposia and seminars devoted to scientific and technological subjects of interest to the countries in their region;

(iv) *intergovernmental meetings:* the regional offices participate in the preparation and follow-up of conferences of ministers and government experts responsible for science and technology;

(v) *studies and research:* the regional offices collect available information and undertake studies in the countries in their regions which help Member States to establish and carry out scientific and technological projects;

(vi) *support for operational programmes:* in pursuance of the decentralization policy, the regional offices, with the assistance of Headquarters (in particular, the Operational Programmes Division), co-operate with Member States for country programming, the preparation of projects and the evaluation of the results achieved. The regional offices help the various technical assistance experts in their work by taking part in inspection missions and participating in the general guidance, supervision and co-ordination of operational projects in their regions.

In the implementation of these tasks, the regional offices maintain close links with the Unesco Regional Co-ordinator and co-operate with the Unesco Regional Office for Education in Asia and the Pacific (ROEAP), with the National Commissions of Member States, with the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP), the field offices of other agencies and programmes of the United Nations system, regional banks and the resident representatives of UNDP, as well as with other intergovernmental and non-governmental organizations of a regional character, so as to ensure regional level co-ordination of the programming and execution of Unesco's activities.

The regional offices are an integral part of the Secretariat of Unesco as regards their programme and budget, their administrative structure and the composition of their staff. For this reason, there will be no separate chapter about the contribution of these offices to the various matters of concern to Unesco. This report therefore contains a large number of references in various places to the work done by these offices, work which is too considerable to be recapitulated here in its entirety. By way of illustration, it is worth mentioning that the Regional Office for Science and Technology for South and Central Asia (ROSTSCA) provided during 1979-1980 support to the Member States in the region in their preparations for the United Nations Conference on Science and Technology for Development and as follow-up organised a meeting in 1980; and assisted Member States in their preparations for CASTASIA II Conference. In the implementation of the Organisation's programmes and activities in the field of science and technology several regional workshops, meetings, seminars and training programmes are convened on subjects of interest and relevance to the Member States in the areas of science policy (priority determination in science and technology programmes), popularisation of science (science museums), basic, life and earth sciences (chemistry, physics, mathematics, informatics, geology and geophysics, lateritization processes) and interdisciplinary sciences (oceanography,

ecology), technological research and higher education (postgraduate education of engineers, solar pumping, scientific and industrial metrology, low-cost housing and quality control of buildings, technician training, etc.), water sciences (ARCCOH meeting, surface and ground water, ice and snow). Besides, international and regional postgraduate courses in geophysics, hydrology and machine foundations, were sponsored, including development of programmes in hydrology, and several technician training programmes (chemistry, hydrology, DNA transfer techniques, etc.). In order to encourage the establishment of regional networks of engineering institutions, scientific and technological information centres, SCAMAP (medicinal and aromatic plants), consultants were engaged and meetings convened which finalised various details and prepared work plans for networks. Consultants and fellowships were provided for the establishment of a Regional Centre on Integrated management of Mountain Eco-systems in Nepal.

Travel and study grants were awarded to enable scientists from the region to participate in international centres and institutes in chemistry and life sciences as well as to senior engineering teachers, marine scientists, hydrologists, etc.

The office continues to collect, disseminate, synthesize and publish information on various aspects of science and technology activities in the Member States of the region within the framework of the Organisation's programmes, and was involved in several surveys and studies undertaken by the Organization in areas such as science policy, engineering sciences, hydrology, marine sciences, ecology, etc.

For operational programmes, the office has been involved in negotiations, planning, formulation, implementation and supervision of national and regional projects financed from extra budgetary sources. Several regional projects were formulated and submitted to funding agencies (networks). Consultant and advisory missions were undertaken by the staff to assist in the formulation of requests for projects in the fields of earth sciences, marine sciences, engineering and environmental sciences. The office continued to collaborate with headquarters and UNDP in the implementation of projects in India, e.g., CEERI, Pilani (Advance Technology in Semi-conductor Devices); NAL, Bangalore (Turbo-machinery and combustion); IIP, Dehra Dun (Petroleum Product Application and Refining); CET (Educational Technology); Postgraduate Agricultural Education; IDC, IIT, Bombay (Industrial Designs); TTTIs (Curriculum Development for Technician Education); Postgraduate Hydrological Education and Research, Roorkee; National Institute of Hydrology, Roorkee; Special Assistance to University Departments (Centres of Advanced Studies); Cultural Property, Lucknow (National Conservation Laboratory).

ROSTSCA was able to establish and develop contacts among specialists in many countries of Asia, Europe and America, with a view to multiplying the effects and bringing in knowledge, experience, information, expertise to the region.

ROSTSCA and ROSTSEA actively collaborated in sponsoring programmes of interest to all the countries of Asia and the Pacific. Close co-operation with NGOs, regional institutions and centres, within and outside the region, was established, such as, ESCAP, RCTT, AIT, COSTED, AEESCA, FEISCA, and several activities were sponsored or jointly undertaken in co-operation with these organizations.

Some examples of the activities of the Regional Office for Science and Technology for Southeast Asia (ROSTSEA) during 1979-1980 are the preparation and follow-up of the United Nations Conference for Science and Technology for Development, the preparation of CASTASIA II Conference, the provision of support for the activities of the regional networks for basic sciences in Southeast Asia. This office provided support through contracts for: four conferences, five symposia, fourteen seminars, twenty workshops, twenty-nine meetings, eleven short-term training courses, and six newsletters (in geosciences, mathematics, engineering, appropriate technology, microbiology and chemistry). The office was instrumental in issuing twenty-two study grants and in organizing one visiting professorship. ROSTSEA played a central part in the convening of two Unesco meetings and one symposium. It also advertised in the region the Unesco-sponsored international postgraduate training courses in the fields covered by the programme in science and technology.

Based on a conservative estimate, 2,250 participants from the region attended activities sponsored or organized by ROSTSEA in 1979-1980. For these activities, ROSTSEA involved experts both from the Asian and Pacific region as well as from other regions of the world.

ROSTSEA was also able to reach a large number of specialists in many countries in Asia, Europe and America, and to multiply the effects of its efforts, through the "networks", or "network-type structures", that have developed in Asia during recent years, due to a great extent to the efforts of Unesco. These networks, and similar structures, are in operation in the fields of microbiology, chemistry, the geosciences, seismology, engineering education and mathematics.

For operational activities, the office assisted in the development of regional projects in technological research and development, volcanological research and training, mangrove ecosystems, and technician training, besides the ongoing projects for the regional seismological network and the formulation of science and technology policy in ASEAN. At the national level, ROSTSEA concentrated its support on operational projects in Indonesia (scientific instruments and marine science), the Philippines (engineering education), Singapore (technician training and popularization of science) and Thailand (marine science).

In the area of studies and surveys, the office assisted studies on roof run-off, hydrological terminology, and data processing for land and water management; it collected information for surveys on research potential, co-operative research programmes and innovative programmes in technician education, and provided support for subregional ecological and agroclimatological surveys. ROSTSEA was also associated in projects for language training for scientists and engineers, for environmental education, for endogenous technology and for the improvement of marine science education.

(b) Unesco/UNDP Regional Technical Assistance Programme

Regional or subregional projects supported by UNDP derive from requests submitted by groups of Member States addressed to UNDP and Unesco within the framework of UNDP's regional or interregional programmes. Some examples of this kind of co-operation are given in Table II below.

Table II
Regional/subregional science and technology projects supported by UNDP, and planned for implementation in 1982 or 1983

CODE	TITLE	Total UNDP contribution (in 1,000 US$)
RAS/79/023	Regional Technical Courses Development in the Pacific	not yet fixed
RAS/79/108	Regional Linkages in Precision Movement and Scientific Instruments	200
RAS/79/116	Regional Seismological Programme for the Anatolian-Zagros-Hindu Kush-Kava Korum-Himalayan-Arakan Ranges	1,000
RAS/79/002	Mangrove Ecosystems for Asia and Oceania	1,400

(c) Unesco's relations with regional and subregional scientific and professional bodies in Asia and the Pacific

Unesco has established working links with a large number of these bodies. Some of them are intergovernmental such as the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP); the Association of Southeast Asian Nations (ASEAN); the Asian Productivity Organization (APO); the Association for Science Co-operation in Asia (ASCA); the South Pacific Bureau for Economic Co-operation (SPEC); the Organization of Southeast Asian Ministers of Education. Other bodies are non-governmental such as the Southeast Asian Mathematical Society; the Asian Physical Society; the Asia Pacific Confederation of Chemical Engineers (APCCHE); the Federation of Engineering Institutions of Southeast Asia and the Pacific (FEISEAP); the Asian Institute of Technology; the Agricultural Information Society for Asia; the Association for Engineering Education in Southeast Asia (AEESEA); the Regional Institute of Higher Education and Development (RIHED); the Institute of Southeast Asian Studies.

3. ACTIVITIES AT THE NATIONAL LEVEL

When a Member State, an Associate Member or a particular group of states so requests, Unesco can provide assistance for the implementation of projects, programmes or other activities forming part of an operation intended to develop education, science or culture. The funds necessary for this assistance may come from the Organization's regular budget, from extra-budgetary resources like those provided by the United Nations Development Programme (UNDP); United Nations Interim Fund for Science and Technology for Development (IFSTD) or from funds-in-trust provided by the Member States themselves.

(a) Unesco's regular programme

Many activities described in this report are financed under Unesco's regular programme. Without going into the detail of all these activities, it is fair to say that they represent a considerable proportion of Unesco's activities aimed at Asian and Pacific Member States, in the field of science and technology.

It should nevertheless be recalled that the activities financed under Unesco's regular programme include those covered by the Programme of Participation in the Activities of Member States. In this instance, the activities are undertaken by the countries themselves with the co-operation of Unesco and frequently take the form of fellowships, travel grants and subventions for the organization of meetings, awared at the request of the Member States or international organizations concerned.

(b) UNESCO/UNDP Technical Assistance Programme

With financial backing from the United Nations Development Programme (UNDP), Unesco is able to provide its Member States and Associate Members in the region at their request, with technical assistance in the fields of science and technology. This is naturally subject to the necessary funds being made available by UNDP. These technical assistance activities form part of the "National UNDP Country Programme".

At the present time, under UNDP country programming arrangements, Unesco is assisting a number of its Member States in Asia and the Pacific in many fields of science and technology. A list of current national science and technology projects for development financed by UNDP is given in Table III. Table IV lists current national projects in the field of science, technical and vocational education financed by UNDP, and executed in co-operation with Unesco. It should be mentioned that these two lists are obviously not exhaustive since Member States may request technical assistance from Unesco (experts, fellowships, equipment) in the most varied fields of science and technology under their own UNDP financial technical assistance country programme.

Table III - Current or planned (up to 1983) national science and technology projects for development, financed by UNDP, executed in co-operation with Unesco

COUNTRY	PROJECT CODE	PROJECT TITLE	DURATION	UNDP contribution in 1,000 US$
Bangladesh	BGD/78/013	Comprehensive Scientific and Technological Research Capacity Study	4 months	100
Bangladesh	504/BGD/40	Development of Technical Education	2,5 years	978
Bangladesh	planned	Strengthening of four engineering colleges: Rnulna, Dacca, Rajshahi, Chittagong	4 years	1,500
Burma	BUR/70/515	Universities Computer Centre	10 years	1,991
Burma	BUR/74/17	Strengthening of Marine Science Teaching and Research at Moulmein College	4 years	1,180
Burma	planned	Upgrading and Strengthening of the Electrical Engineering Laboratory at the Rangoon Institute of Technology (R.I.T.)	2 years	3,000
Burma	planned	Upgrading of Science Laboratories at the Rangoon Arts and Science Laboratory (RASU)	5 years	2,600
Burma	planned	University Centre for Instrumental Analysis	3,5 years	2,884
China	CPR/79/008	Strong Motion Radio Telemetry Network	3 years	630
China	CPR/80/036	Priority Research Projects in Science and Technology	2 years	670
China	CPR/80/037	Experimental Research Centre of Organic Geochemistry	2 years	43
China	CPR/80/040	The Experimental Site for Earthquake Prediction at Beijing-Tianjin-Tangshan-Zhangjiakou Region	3 years	1,004
China	CPR/80/041	Improvement of Technical Training and Research in Universities	3 years	798
China	CPR/80/043	Development of China Research Institute of Printing Science and Technology	3 years	251
Democratic People's Rep. of Korea	planned	Strengthening of the Scientific Basis at the Marine Mineral Resources Institute	4 years	1,800
India	IND/78/001	Special Assistance to Selected University Departments (Phase II)	4 years	2,545
India	IND/71/617	Assistance to the Indian Institute of Petroleum (Phase II)	11 years	2,129
India	IND/72/047	Advanced Technology in Semi-conductor Devices at the Central Electronics Engineering Research Institute, Pilani	6 years	2,349
India	IND/78/056	Postgraduate Hydrological Education and Research, Roorkee	3 years	395
India	IND/74/045	National Institute of Hydrology, Roorkee	7 years	900
India	IND/77/013	Industrial Design Centre, Bombay	4 years	528
India	IND/71/627	Establishment of a Turbomachinery and Combustion Laboratory, NAL, Bangalore	9 years	1,971
Indonesia	INS/78/073	Calibration Network and Instrument Development, Bandung	4 years	423
Indonesia	INS/72/038	Marine Science Research	6 years	122
Lao People's Democratic Republic	LAO/79/003	Educational Material Production	3 years	184
Lao People's Democratic Republic	planned	Lao Polytechnic Institute	-	-
Malaysia	MAL/76/017	Kuantan Polytechnic	3 years	314
Malaysia	planned	Development of Five Polytechnics	-	-
Maldives	planned	Institution Building for Human Resources Development	-	-
Mongolia	MON/80/005/A	Joint Centre of Science and Technological Research, Information and Training	1 year	200
Nepal	planned	Establishment of a Network for the Application of Science and Technology in Nepal	2 years	-
Pakistan	PAK/77/010	Applied Science Development at Quai-i-Azam University	5 years	1,443
Pakistan	PAK/79/007	Scientific Instrumentation Centre, University of Peshawar	4 years	423
Philippines	PHI/77/007	Assistance to the College of Engineering	6 years	1,583
Philippines	planned	Tarlac College of Technology	-	-
Philippines	planned	Rizal Technical College	4 years	621
Republic of Korea	ROK/80/002	Korea Ocean Research Development Institute (Phase II)	2 years	435
Republic of Korea	planned	Training of Technicians for Instrumentation and Repair for KORDI	3 years	1,285

Table III - continued

COUNTRY	PROJECT CODE	PROJECT TITLE	DURATION	UNDP contribution in 1,000 US$
Singapore	SIN/78/005	Workshop Curriculum and Staff Development Programme for Ngee Ann Technical College	3 years	295
Singapore	SIN/78/006	Centralized Equipment Workshop, University of Singapore	2 years	35
Singapore	SIN/78/009	Singapore Polytechnic (Phase II)	4 years	364
Singapore	SIN/80/003	Planitarium and Science Exhibit Project	2 months	10
Socialist Republic of Viet Nam	planned	Strengthening of the Institute of Oceanography Nha Trang	-	1,199
Socialist Republic of Viet Nam	planned	Teaching Aid Production	-	184
Socialist Republic of Viet Nam	planned	Strengthening of the Ho Chi Minh City Polytechnic University	4 years	959
Sri Lanka	SRL/74/072	Industry-Oriented Training at the University of Moratuwa	6 years	2,058
Sri Lanka	SRL/78/034	Assistance to the Technical Education Programme of the Open University of Sri Lanka	3 years	1,887
Sri Lanka	planned	Expansion of the Faculty of Engineering at the Peradeniya University	5 years	1,600
Sri Lanka	planned	Development of Computer and Microprocessing Facilities, Moratuwa University	3 years	2,972
Sri Lanka	planned	Selected University Departments	3 years	1,430
Thailand	THA/78/021	Improvement of Marine Science Education (postgraduate level)	7 years	545
Thailand	THA/81/T01	Improved Planning and Delivery Capabilities in the Ministry of Science, Technology and Energy	4 years	436

Table IV - Current national projects in Science, Technical and Vocational Education financed by UNDP, executed in co-operation with Unesco

COUNTRY	PROJECT CODE	PROJECT TITLE	DURATION	UNDP contribution in 1,000 US$
Afghanistan	AFG/79/004	Science Education	4 years	469
India	IND/77/015	Curriculum Development for Technician Education	5 years	1,594
Indonesia	INS/78/069	Improvement of Science and Mathematics in Secondary Schools	4 years	2,128
Indonesia	INS/78/071	Technical Teacher Training, EKT-IKIPS Jogyakorta and Padang	3 years	1,970
Mongolia	MON/79/005	Strengthening of the Teaching and Scientific Basis of the State Pedagogical Institute	5 years	1,246
Philippines	PHI/73/014	School Science Equipment Production and Distribution	8 years	701
Singapore	SIN/78/004	Development of Aptitude Testing and other Selection Procedures for Vocational and Industrial Training	4 years	263
Thailand	THA/72/029	Institute for the Promotion of Science Teaching (IPST)	9 years	1,966
Thailand	THA/79/023	Strengthening the above-mentioned IPST Regional Teacher Servicing Centres and Developing Science and Mathematics Curricula for Technical and Vocational Education	2 years	356

Part II
DESCRIPTION OF PROGRAMME ACTIVITIES

SECTION I.
Science in the Contemporary World

ACTIVITIES AT WORLD LEVEL

Title: Impact of science on society.

Brief description: a quarterly journal published by Unesco in English and French, and issued also in Portuguese, Spanish and Arabic. As of 1981 a Chinese edition of the journal will also be available.

Main aim: to disseminate information and current trends of thought or action about science and/or technology in the contemporary world in relation with its societal impact.

Specific activities: editing, production, distribution and promotion of the journal.

Co-operation in the organization of a course in Southeast Asia on the theme "Applying Scientific and Technological Advance to Socio-Cultural Change Resulting from Development". The execution of this activity has been decentralized to the Regional Office for Science and Technology in Southeast Asia (ROSTSEA).

Linkage: Science and technology policies (Section II)below.

Background information:
- 19 C/Resolutions 2.111 and 2.112;
- 20 C/Resolution 2.41;
- 21 C/Resolution 2/01 in Unesco's Approved Programme and Budget for 1981-1983 (document 21 C/5);
- Unesco's Medium-Term Plan for 1977-1982, Objective 4.1.

SECTION II
Science and Technology Policies

A. ACTIVITIES AT WORLD LEVEL

Title: Science and technology policy programme.

Principles of action: Unesco's activities in this field are based particularly on the following facts and principles:

(i) a nation's science and technology policy is one of the most dynamic factors in its overall national development and security; and

(ii) support to creative research and experimental development lies at the basis of a nation's self-reliance and fosters endogenous development;

(iii) the rationally planned and innovative application of science and technology enables countries more rapidly to take advantage of recent discoveries and inventions;

(iv) scientific and technological interdependence which is based on judicious transfers of knowledge and know-how, and which respects the dignity and the interests of all, contributes to an effective way to the maintenance of peace between the nations.

Main aims and functions: the activities of the Division of Science and Technology Policies can be divided into the following main functional areas:

(i) *Standard-setting and methodological activities* whose purpose is to support—and also to justify—certain norms or methods of action that could usefully be adopted/applied by the Member States and the international community, in the field of policy-making for science and techology.

Examples are:
- the responsibilities and rights of scientific workers, such as described in the Recommendation concerning the Status of Scientific Researchers and the extent to which that standard-setting text has found application in the Member States;
- the human values and ethical criteria to be taken into consideration in selecting the objectives of scientific research and experimental development (R&D) at both the national and the international levels;
- the multilingual terminology used in policy-making for science and technology as exemplified by the SPINES Thesaurus, a controlled and structured vocabulary for planning, management and practical application to development, of which English and French versions have been produced (Spanish and Portuguese versions are in preparation; Arab, Russian and Dutch versions are also envisaged). The thesaurus enables the indexing, at the national or international level and in computerized or manual systems, of documents dealing with development whether from a scientific and technological or a socio-economic point of view; it also enables the description of ongoing research projects and expert profiles for the use of decision-makers;
- planning, programming and budgeting techniques applicable to scientific and technological activities at national level. Examples are the Unesco manuals for establishing national budgets, and for determining priorities in the field of science and technology; and for building up a data base on the national scientific and technological potential.

These standard-setting and methodological activities constitute the intellectual and operational basis for the Organization's technical co-operation with its Member States in the sphere of science and technology policies (see (vii) below).

(ii) *'Forum' activities* designed to enhance international exchange of useful information relating to Member States' policies for science and technology.

Examples are the periodical Unesco conferences which bring together the ministers in charge of science and technology policies at the regional level; mention should be made in this connection of the MINESPOL and CAST type conferences, on the application of science and technology to development. The main current activity in this field is the preparation and holding of the second Conference of Ministers Responsible for the Application of Science and Technology to Development and those Responsible for Economic Planning in Asia and the Pacific (CASTASIA II, to be held in 1982; see under "Regional activities" below).

At government expert level, mechanisms may be established for continuing concertation among the Member States of a given region, the Secretariat of

which rests with Unesco; a case in point is the Standing Conference of National Science and Technology Policy-making Bodies for Latin America and the Caribbean which held five sessions since its establishment in 1966. A similar mechanism is also envisaged for Africa.

(iii) *Activities in support of organized scientific and technological co-operation among Member States in a given region.* The growing trend towards close association of countries belonging to the same (sub) region raises the problem of harmonizing or even integrating their national policies in many fields which are normally the sovereign province of the partner governments. Unesco assists these associations of Member States upon request, sometimes with the financial support of UNDP, with a view to speeding up the formulation and implementation of joint science and technology policies for such communities of states. Examples that may be cited in this respect are the West African Economic Community (CEAO), the Convenio Andres Bello (SECAB) for the Andean countries, the Caribbean Council for Science and Technology (CCST) and the Association of Southeast Asian Nations (ASEAN).

(iv) *International comparative studies and research* on contemporary problems of interest to Member States' science and technology policies. The following may be listed among such ongoing activities:

- the international comparative study on the organization and performance of research units, in which more than ten Member States from Asia, the Arab States region, Europe and Latin America have participated;
- the research project on societal utilization of research and experimental development (R&D);
- the construction of meaningful indicators of scientific and especially of technological development, the definition and utilization of which may help improve the selection and assessment of operative technologies;
- the stimulation of national demand for technological progress, i.e. for instance by appropriate reorientation of the states' purchasing power and by the use of fiscal or other techniques aimed at promoting national R&D activities.

(v) *Development and promotion of information exchange for policy-making in the field of science and technology.* This type of activity comprises, *inter alia:*

- the preparation of regional compendia (Africa, Arab States, Asia, Europe, Latin America) on the science and technology policies of Member States; such compendia are normally published on the occasion of the ministers' conferences mentioned under section (ii) above. Detailed national monographies on the same subject are also published at irregular intervals at the request of the Member States concerned;
- maintenance of a data base concerning national science and technology policies;
- the publication of directories on teaching and research units dealing with subjects related to policy-making for science and technology existing in the Member States of Unesco, and on their national science and technology policy-making bodies (Ministries, Federal Councils for Science and Technology, National Research Councils, etc.);
- the setting up of bibliographic and factual data bases at national level in support of policy-making for science and technology; their possible interconnection through the international information system SPINES, proposed by Unesco;
- the publication of c. fifty books and monographies in the Unesco series "Science Policy Studies and Documents" and elsewhere.

(vi) *Training of qualified personnel in the field of planning, organization and management of national science and technology policy.* These activities encompass the following:

- the granting of observation fellowships and study fellowships (about fifteen per year) awarded respectively to high officials and to students wishing to specialize, by means of foreign travel, in questions concerning science and technology policies;
- the organization of national symposia, regional training seminars and summer courses for science policy-makers and research managers;
- the preparation of a feasibility study on the establishment of an international institute for the planning of scientific and technological development;
- the preparation of teaching modules and syllabi for those training courses;
- the publication of a book aimed at young and informed readership, on the life and work of scientific researchers;
- the publication of an 'Introduction to policy analysis in science and technology' for specialized readers.

(vii) *Advisory services to Member States* for the formulation and implementation of national science and technology policies for development. Unesco's technical co-operation may bear, as the case may be and according to the request received from the Member States concerned, on the following activities:

- the design, establishment and functioning of science and technology policy-making machinery;
- the preparation of scientific and technological development plans and budgets consonant with the overall development plans of the countries concerned;
- survey and analysis of the national scientific and technological potential;
- the identification of priorities for the national R&D system and related scientific services, and evaluation of their level of performance and effectiveness;
- development of the countries' institutional base for science and technology, through systematic assessment of the needs linked with national development and with the obstacles confronting developing countries in this respect;
- the identification and formulation of projects which meet those needs, with a view to securing their long-term financing from extra-budgetary sources;
- the improvement of laws and regulations governing the working conditions of scientific researchers.

Approximately one hundred and fifty advisory missions of this kind have been carried out over the past fifteen years, followed by reports and recommendations for action addressed to the governments concerned. Such technical co-operation extended by Unesco to its Member States is at present financed out of the Organization's regular budget, and also under the United Nations Development Programme (UNDP), the United Nations Interim Fund for Science and Technology (IFST), and under funds-in-trust agreements.

(viii) *Co-operation* with non-governmental organizations active in the field of science and technology policy; for example:

- the International Council for Science Policy Studies (IUHPS/ICSU);
- the Research Committee on "Science and Politics" of the International Political Science Association (IPSA);
- the Science Policy Committee of the World Federation of Scientific Workers;
- the ICSU Committee on the Safeguard of the Pursuit of Science.

(ix) *The setting up of international or regional instruments or mechanisms for the financing of scientific and technological development of Member States.* An important feature of Unesco's Science and Technology Policies Programme concerns the *financing* of research programmes and projects of developing countries, in the field of science and technology. Illustrative examples of these activities are the establishment of the Unesco Special Fund for Research and Experimental Development (R&D) in Africa and the drawing up of an integrated programme for the scientific and technological development of the Caribbean region.

(x) *Participation in the formulation of a harmonized and gradually integrated science and technology policy for the organizations belonging to the United Nations system.* This implies a close collaboration on the part of Unesco, with the United Nations Intergovernmental Committee on Science and Technology for Development, its Advisory Committee (UNSTAC) and with the United Nations Centre for Science and Technology for Development.

Principle achievements:
- publication of a guidebook for the assessment of national, scientific and technological potential (SPS No. 15; new edition under preparation);
- publication of an international standard nomenclature for the various branches and disciplines of science and technology (UNESCO/NS/ROU/257 Rev.);
- publication of the 'SPINES Thesaurus' (SPS No. 39);
- publication of a handbook on priority determination at the national level in the field of science and technology (SPS No. 40);
- publication of 'An introduction to policy analysis in science and technology' (SPS No. 46);
- publication of a document on 'Societal utilization of R&D' (SPS No. 47);
- publication of a 'Manual on national budgeting for scientific and technological activities' (SPS No. 48);
- preparation of a 'World directory of research projects, studies and courses in science and technology policy' (SPS No. 49);
- publication of a book entitled 'Science for development' (Unesco, 1971);
- publication of a book entitled 'Scientific productivity—The effectiveness of research groups in six countries' (Cambridge University Press—Unesco 1979);
- adoption by the eighteenth session of Unesco's General Conference of the Recommendation on the Status of Scientific Researchers (1974);
- Regional Conference of Ministers responsible for the Application of Science and Technology to Development:
  1965 CASTALA Latin America (Santiago, Chile);
  1968 CASTASIA Asia (New Delhi, India);
  1970 MINESPOL Europe (Paris, France);
  1974 CASTAFRICA Africa (Dakar, Senegal);
  1976 CASTARAB Arab States (Rabat, Morocco);
  1978 MINESPOL II (Belgrade, Yugoslavia);
  1982 CASTASIA II (Manila, Philippines);
- publication of surveys, reports and other studies in the series 'Science policy studies and documents' (fifty volumes published since 1965);
- establishment, with Unesco's assistance, of governmental organizations for science and technology policy in more than twenty states; submission of c. 150 expert reports to the governments of Member States on problems concerning national policies in the field of science and technology.

Background information:
- programe launched in 1960 (11 C/Resolution 2.113/b);
- 19 C/Resolutions 2.121, 2.122 and 2.123;
- 20 C/Resolutions 2/4.2 and 2/10.1;
- 21 C/Resolution 2/01/4.2;
- Unesco's Medium-Term Plan for 1977-1982, objective 4.2.

Organizations responsible: Unesco, with the collaboration of certain international non-governmental organizations. In addition, Unesco's programme on science and technology policy takes fully into consideration the resolution adopted in this field by the General Assembly of the United Nations, by the United Nations intergovernmental Committee on Science and Technology for Development, and by the United Nations Conference on Science and Technology for Development (UNCSTD, Vienna, 1979).

Organizational machinery: Unesco's General Conference, Executive Board and Secretariat.

Participants: all Member States of Unesco, particularly the national bodies responsible for science and technology policy.

B. ACTIVITIES AT REGIONAL LEVEL

Title: Promotion of science and technology policies in the Asian and Pacific region.

Principles of action and main aims: regional conferences of ministers (± ten-year cycle) and other regional meetings are convened with the following objectives in mind:
- to allow for international comparisons and periodic assessment by Member States collectively at the regional level, of the current trends in their national science and technology policies;
- to allow for thorough discussions of current problems of common interest to policy-makers in science and technology of the region concerned;
- to strengthen the capability of Member States in the region in formulating and implementing science and technology policies with a view to applying science and technology to the solution of their national development problems;
- to plan for and evaluate the results of regional co-operation in science and technology;
- to provide information and policy guidance to potential partners in co-operation and aid-giving agencies;
- to promote a more systematic orientation of the world's co-operative research activities towards the major problems of survival and development which confront mankind.

Specific activities and principal achievements:

(i) The holding of regional meetings and conferences in Asia and the Pacific and implementation of the recommendations adopted. As far as these conferences and meetings are concerned, particular mention should be made of the following:
- CASTASIA I Ministerial Conference on the Application of Science and Technology to the Development of Asia (held in New Delhi in 1968);
- Asian Seminar on Science and Technology Policy (Jakarta, Indonesia, October 1974) which constituted a follow-up to the recommendations of CASTASIA I and was convened in pursuance of resolution 2.121(a) adopted by the General Conference of Unesco at its seventeenth session (1972);
- Meeting of Directors of National Councils for Science Policy and Research in Asia and Oceania (Kuala Lumpur, Malaysia, 1975), the preparation of which was discussed by participants during the above-mentioned Asian seminar on Science and Technology Policy. The meeting was undertaken in pursuance of resolution 2.121 adopted by the General Conference of Unesco at its eighteenth session (1974);
- Asian Workshop on Science and Technology Policy Priorities for Regional Co-operation Programmes (Bangkok, Thailand, 1978) which was held in pursuance of resolution 2.121 adopted at the nineteenth session of the General Conference of Unesco, and which was designed to contribute to the preparatory activities of the United Nations Conference on Science and Technology for Development (UNCSTD).
- *Publications:* a book entitled "Science and Technology in Asian Development" published in 1970. An "Inventory of Regional Co-operative Programmes in Science and Technology, Asia and the Pacific" compiled by ROSTSEA in 1978 and updated by the same office in 1981.

(ii) Advisory mission to the Association of Southeast Asian Nations (ASEAN).

Brief description: During the Second ASEAN-UNDP/ESCAP Review Meeting held in Bangkok in February 1979, a programme of technical support to the ASEAN secretariat was adopted. This programme was designed *inter alia* to assist the

ASEAN secretariat in the formulation of a draft concept and plan for the utilization of science and technology for development in ASEAN. For this purpose, two consultants carried out missions in the ASEAN member countries in order to collect and compile relevant data and information on existing ASEAN policies at both national and regional levels in the fields of science and technology. On the basis of these data and other relevant information, a final report entitled 'Towards an ASEAN Science and Technology Plan' was prepared by the consultants and submitted to appropriate bodies of ASEAN in February 1980.

The reference of the report is: UNDP/RAS/78/038, Serial No. FMR/SC/STP/80/202 (UNDP).

Background information:
- programme launched in 1960 (11 C/Resolution 2.113/b);
- 19 C/Resolutions 2.121, 2.122 and 2.123;
- 20 C/Resolutions 2/4.2 and 2/10.1;
- 21 C/Resolution 2/01/4.2;
- Unesco's Medium-Term Plan for 1977-1982, objective 4.2.

C. ACTIVITIES AT NATIONAL LEVEL

Title: Improved planning and delivery capabilities in the Ministry of Science, Technology and Energy (MSTE) of Thailand.

Reference: THA/81/T01/A/71/13.

Background information: duration of the project: 4 years, started June 1981.

Organizations responsible: Unesco as executing agency and the Ministry of Science, Technology and Energy of Thailand as government implementing agency.

Brief description: the project is destined to strengthen the activities of those divisional or organizational units of the Ministry of Science, Technology and Energy of Thailand, most in need for the Ministry to discharge its functions adequately in respect of:
(i) the planning of the national policy for science and technology;
(ii) the promotion of information on science and technology and their popularization;
(iii) the effective transfer of technology; and
(iv) the efficacy of the scientific and technical services to meet public demand.

Main aim: within the framework of the overall socio-economic policies of the Royal Thai Government, the general objective of the project is to enhance the use of science and technology through its more deliberate and explicit incorporation into both the planning and the implementation stages of the development programmes of the country and in respect of the government, higher education and private sectors of the economy.

Specific activities:
(i) increasing the capability of the Office of Science, Technology and Energy Policy and Planning so as to enable it to carry out the necessary surveys and analyses in support of policy formulation;
(ii) co-ordinating the various specialized S&T documentation centres through the setting up of a national S&T information network system;
(iii) enhancing the technology transfer process through specifying the types of services to be rendered by the ministry, identifying the clientele aimed at, especially in rural areas, and designing appropriate methods of assessment and choice and working procedures;
(iv) improving the efficiency of scientific services through the co-ordination of existing establishments in the field of metrology and instruments calibration and testing.

Expected results: the project is expected to produce:
(i) improved methods of surveying the scientific and technological resources of the country;
(ii) a design for a national S&T information network system and for related data bases;
(iii) a feasibility study on the setting up of technology transfer field branches for rural areas; and improved advisory services to business enterprises on licensing practices; and
(iv) organizational and legal arrangements for the rationalization of work in the field of metrology and instruments calibration and testing as among the Departments of MSTE and other establishments.

SECTION III
Scientific Research and Higher Education

A. ACTIVITIES AT WORLD LEVEL

Title: Promotion of scientific research and higher education.

Principles of action: the activities are carried out:
(i) giving priority to those scientific disciplines and research areas which are of the greatest use to development;
(ii) in close co-operation with the appropriate units of Unesco's Education Sector;
(iii) in co-operation with the International Council of Scientific Unions (ICSU).

Main aims:
(i) to encourage the progress of fundamental scientific knowledge and the training of high-level scientific manpower, bearing particularly in mind the needs of the developing countries;
(ii) to develop and improve teaching and research in biology, chemistry, physics and mathematics at university and postgraduate level.

Specific activities:
(i) the organization of meetings, study courses and training courses in those scientific disciplines of most use to development;
(ii) creation of and assistance to appropriate research institutions to stimulate international and regional co-operation in the basic sciences;
(iii) studies on new methods used in research training and in the teaching of science at university and postgraduate level;
(iv) assistance to Member States in planning and programming training in research;
(v) assist the European scientific community in the selection of priority research fields related to the satisfaction of human needs in the Europe and North America region.

Achievements: see the achievements described under the more specific activities mentioned below under 'Regional and interregional activities'.

Background information:
- 19 C/Resolution 2.131;
- 20 C/Resolution 2/4.3 and
- 21 C/Resolution 2/01 in Unesco's Approved Programme and Budget for 1981-1983;
- Unesco's Medium-Term Plan for 1977-1982, objective 4.3.

B. ACTIVITIES AT REGIONAL AND INTERREGIONAL LEVEL

1. Title: Regional and co-operation in basic sciences in Southeast Asia:
(a) network in the chemistry of natural products;
(b) network in the microbiology of natural products.

Brief description and principles of action: (applicable to both networks): The regional networks have been designed for purposes of promoting the applications of chemistry and of microbiology of natural products with a view to catalysing research, training and development in the region of Southeast Asia.

As established in 1974, the organizational elements in the chemistry and microbiology networks are the national points-of-contact and the network headquarters. Starting at the grass-roots level, national participating bodies are simply those institutions that are actively participating in the network. Then, within any given country, a specific institution serves as the national point-of-contact. This is the pipeline through which information is channelled between the regional and national levels. On a regional basis, policy is formulated by the regional co-ordinating meeting, which consists of one representative from each of the participating countries and Unesco representatives. At the operational level, the regional network headquarters are based in one of the participating countries, on a rotational basis. The functional elements of the programme include such activities within the region as: the exchange of scientists programmes, organization of training courses, seminars and symposia, maintenance of a regional inventory of special equipment, development of teaching materials for use in the region, collection and dissemination of research information in the region through the publication of research newsletters and bulletins, determination of regional priorities and the provision of a regional link with other regional and international bodies.

Main aims: to promote and foster the development of research and training programmes and the strengthening of research units working on the chemistry and microbiology of natural products. To assist in expanding the exchange of knowledge and the scope of research in the selected fields through:
(i) stimulation of the co-operation with research institutes on national and regional level;
(ii) exchange of scientists among the countries in the region in all directions;
(iii) organization of regional training courses, seminars, symposia and workshops;
(iv) developing of long- and short-term fellowship programmes for young scholars to work in the selected research field;
(v) disseminating knowledge also through collaboration with UNISIST and the regional project for training science information specialists, RAS/75/034;
(vi) setting up of regional research teams for solving specific problems in selected fields, which are of major importance for the economic development of the region;
(vii) evaluating of the social and economic consequences of the application of the research results for well-being of mankind and the safeguarding of his environment;
(viii) spending up of the training of manpower for teaching in the selected disciplines at all levels.

Specific activities and achievements: several conferences, meetings, seminars, advisory missions, training courses and round-table discussions have been organized within the framework of both networks. Likewise several fellowship grants have been made available. Furthermore, 'Newsletters' are regularly issued by the headquarters of networks.

Organizations responsible: Unesco, jointly with National Commissions of participating countries.

Participating countries (for both networks): Australia, Japan, New Zealand, the Philippines, Malaysia, Singapore, Thailand, Hong Kong, Indonesia, Republic of Korea.

2. Title: MIRCEN network in environmental, applied microbiological and biotechnological research.

Brief description and main aims: the MIRCEN programme embodies activities that are carried out within the framework of Unesco's regular project activities in co-operation with ICRO, IOBB, WFCC and other bodies and the UNEP/-Unesco project on the use and preservation of microbial strains for deployment in environmental management.

A worldwide programme for preserving microbial gene pools and making them accessible to the developing countries has been launched through the establishment of a world network of Microbiological Resources Centres (MIRCENs) which are designed to:
(i) provide the infrastructure for a world network which would incorporate regional and interregional co-operating laboratories geared to the management, distribution and utilization of the microbial gene pool;
(ii) reinforce efforts relating to the conservation of micro-organisms, with emphasis on *Rhizobium* gene pools, in developing countries, with an agrarian base;
(iii) foster the development of new inexpensive technologies native to the region;
(iv) promote the applications of microbiology in order to strengthen rural economies; and
(v) serve as focal centres for the training of manpower and the diffusion of microbiological knowledge.

Specific activities and achievements: collection, identification, maintenance, testing and distribution of rhizobial cultures compatible with crops of the region. Identification of problems pertinent to the deployment of local rhizobia inoculent technology and promotion of research are other activities.

Advice and research guidance are provided to individuals and institutions engaged in rhizobiology research. The MIRCEN also provides short- and long-term training in the development of scientific and technical manpower required for the use of rhizobial inoculants. The centre disseminates information in the region to agricultural workers and microbiologists, through bulletins, newsletters and demonstrations.

Organizations responsible: National Commissions for Unesco, scientific professional bodies.

Participating countries: Thailand, Indonesia, Singapore, Philippines, Republic of Korea, China.

3. Title: Contribution to the determination of research priorities linked with human needs and societal goals.

Main aims:
(i) contribute to a better understanding of human needs as related to oriented research;
(ii) assist in reorienting scientific research towards the satisfaction of human needs and societal goals;
(iii) establish a better information system on priorities for research related to human needs.

Specific activities: in co-operation with COSTED and with other scientific institutions in Asia, two activities will be developed in connection with this project:
(i) COSTED and other institutions in India are to be part of the documentation and information network on research and human needs which will be established and will link institutions and research workers dealing with research activities aimed towards the satisfaction of human needs;
(ii) a workshop which is taking place in November 1981 in Madras, discusses priorities for research in the Asian

region linked with the satisfaction of human needs, with a view to establishing a regional project on material sciences within the framework of the programme on research and human needs.

4. Title: Development of international co-operation in informatics.

Brief description: in order to ensure that the potentiality of informatics is directed towards peace, equality of opportunity, increased scientific and technological knowledge for development, and diminution of the gap between the developing and industrialized countries, development of international co-operation in informatics is made one of the main thrusts of the Organization's programme in informatics. This aspect consists of co-operation in informatics activities with the rest of the United Nations system and other international organizations such as the Intergovernmental Bureau for Informatics (IBI). It involves also collaboration with the competent non-governmental organizations such as the International Federation for Information Processing (IFIP) in order to enable them to spread their scientific and professional activities to developing countries.

Principle of action and main aims: as far as the United Nations systm and other intergovernmental organizations are concerned, the principle of action consists of participation in one another's activities as well as mutual information exchange. For the international non-governmental organizations, use is made of their competence and resources to benefit developing countries.

The main aims of this activity include increase in interaction among informatics experts all over the world in order to eliminate isolation of such experts, especially in developing countries. This international co-operation also has the goal of aiding transfer and adaptation of appropriate technology in computer technology.

Specific activities at regional level: Unesco and the IFIP Committee on Informatics for Development (ICID) jointly organized an international symposium on informatics for development, INFORMATICS 81. The symposium was held in New Delhi, India, on 27-28 February and 1 March 1981. The local sponsor of the symposium was the Computer Society of India.

Following the meeting of Computer Centre Directors in South and Central Asia organized by Unesco in Kathmandu, Nepal, 29 October-1 November 1979, and in which delegates from Afghanistan, Bangladesh, Iran, India, Nepal, Pakistan and Sri Lanka participated, a consultancy mission was implemented to study the feasibility of establishing a regional informatics network for South and Central Asia.

As part of the activities to launch the regional network of informatics centres in South and Central Asia, a seminar on the application of informatics in the region is being organized and foreseen to take place in Pakistan in 1982. Participants at the seminars are expected to include those from countries represented at the Kathmandu meeting as well as Burma and Mongolia.

Also in South and Central Asia, a regional workshop on Application of Computer Techniques for Development was organized for 9-19 December 1981 in the Indian Institute of Technology, Kanpur, India. The Unesco Regional Office of Science and Technology in New Delhi, which directly organized the workshop in co-operation with the headquarters, arranged to have participants from Afghanistan, Bangladesh, Burma, Iran, India, Mongolia, Nepal, Pakistan and Sri Lanka.

In Southeast Asia, the meeting of Computer Centre Directors in the region held in Jakarta, Indonesia, 20-24 October 1980, also recommended the establishment of a regional network of informatics centres. In the organization of the meeting Unesco had the co-operation of the Southeast Asia Regional Computer Confederation (SEARCC). The meeting was attended by delegates from Malaysia, Thailand, Singapore, Philippines, Indonesia, Hong Kong, Japan and the Republic of Korea. As a result of the recommendations of the meeting, a consultancy mission to study the feasibility of establishing the network of informatic centres in the region is planned for the 1981/1983 triennium to be followed by launching activities including a seminar on application of informatics technology in the region.

The objective of establishing regional networks of informatic centre is to achieve greater concentration and effectiveness in the transfer and adaptation of technology. In particular it is supposed to promote regional co-operation in informatics, especially with reference to exchange of experiences in the application of informatics, establishment of software exchange programmes and common maintenance efforts of software and hardware. It is also to enhance constant review of computer equipment procurement, as well as promote training programmes and personnel exchange programmes at the regional level.

Specific activities at national level: at the national level, activities include those concerned with education and training of personnel. They involve establishment of and support for computer science programmes in higher education, and their adaptation to the countries particular needs. The recommendations of the SPIN Conference in 1978 as well as those of the Advisory Group on Informatics convened by Unesco in 1979, emphasized the importance of training of personnel in this field for developing countries. In order to reduce the acute shortage of qualified personnel, particularly in the developing countries, and to enhance appropriate transfer and adaptation of technology, education and training of personnel, long-term as well as short-term training courses were given priority in both developing and industrialized countries.

The training course in computer technology in Tokyo, Japan, continues to be supported. This short-term training course ins organized annually, jointly by the Government of Japan through Japan International Co-operation Agency (JICA) and the Asia Electronics Union. In 1981 it was planned for the participation of seventeen candidates from Bolivia, Guatemala, India, Indonesia, Iraq, Korea, Mexico, Pakistan, Papua New Guinea, Peru, the Philippines, Saudi Arabia, Singapore, Sri Lanka, Thailand and Turkey. The course is supported by Unesco under contract with the Asia Electronics Union in order to facilitate the participation of candidates from developing countries.

In 1981 a training course in informatics was organized in China. The course ran for ten weeks in the People's University of Beijing from June to August. The course had the purspose of training computer specialists from various ministries, state enterprises and educational institutions in order to ensure better utilization of modern computer management techniques in the People's Republic of China. For the realization of the course, Unesco co-ordinated with the State Commission for Science and Technology.

Other activities which are being implemented under the informatics regular programme along with those that have been mentioned concern information on informatics, as well as micro and mini computers.

5. Title: Development of international co-operation in mathematics.

The current main activities in this field in Asia concern the co-operation with the Southeast Asian Mathematical Society (SEAMS).

Principle of action: the activities are carried out to encourage co-operation between mathematicians of the region, and in particular of all Southeast Asian countries.

Specific activities: the activities of SEAMS, which was founded in 1975 and benefits from an excellent internal organization, have been constantly expanding and Unesco's sponsorship an financial support to most of them seem to have

contributed to their success. They mainly consists in:
(i) high-level seminars in various mathematical topics, which the participation of outstanding mathematicians invited also from other countries, like Japan and Australia, or from Europe and the United States of America;
(ii) training course for young researchers from SEAMS countries;
(iii) scientific publications, like the Bulletin of SEAMS;
(iv) granting of fellowships.

Participating countries: Indonesia, Malaysia, Thailand, the Philippines, Singapore, with the attendance of representatives of Hong Kong and Australia.

SECTION IV
Technological Research and Higher Education

A. ACTIVITIES AT WORLD LEVEL

1. Title: Promotion of international co-operation in research and training in priority fields of the engineering sciences.

Principles of action: to carry out co-operative international activities in priority fields such as low-cost housing, applications of modern engineering methods and metrology, through manuals, training courses, exhibitions and demonstration projects.

Main aims: to promote the development of endogenous technologies and to disseminate information on innovative approaches in the application of engineering sciences to development.

Specific activities: preparation of training manuals, training of monitors, formation of working groups to develop and evaluate training materials, preparation of exhibitions, study tours, provision of consultants, support to pilot projects.

Background information: 21 C/5 Resolution 2/01.

Organizations responsible: Unesco, in co-operation with non-governmental organizations, notably the Union of International Technical Associations (UATI), the World Federation of Engineering Organizations (WFEO), the International Council of Scientific Unions (ICSU) and the Commonwealth Science Council (CSC).

Participating countries: all Member States.

2. Title: Improvement of the training of engineers and technicians.

Principles of action: concentration on priority areas such as curricula design, technician training, continuing education, education-industry co-operatin and environmental aspects of engineering education.

Main aims: to improve the quality and relevance of the education of engineers. To promote the education and training of technicians. To further develop the programme of post-graduate courses for training engineering research workers.

Specific activities: preparation of guides, publications and brochures on engineering education. Support to non-governmental organizations for newsletters and specific activities in priority areas. Training seminars for engineering professors and technician teachers. Studies and publications on the roles and status of technicians. Adaptation of training materials to meet specific needs of developing countries. Exchange visits with inter-institutional links. Advisory missions of staff or consultants.

Organizations responsible: Unesco, in co-operation with ILO, UNIDO and international and regional non-governmental organizations.

Participating countries: all Member States of Unesco.

3. Title: Promotion of research and experimental development aiming at national utilization of conventional and non-conventional sources of energy. Development of information systems on new and renewable sources of energy.

Principles of action: co-operation with other organizations of the United Nations system and with non-governmental organizations in establishing international co-operative programmes and linkages. Emphasis is placed on training and on exchange of information.

Main aims: to assist Member States in research and development on new sources of energy, especially new and renewable sources and those for rural and dispersed populations.

Specific activities: training workshops, courses and demonstration projects. Preparation of training materials and brochures. Exchanges of personnal, study visits. Organization of meetings on energy problems, pilot projects on energy information systems.

Background information:
- 20 C/5 Resolution 2/01.
- Results of the United Nations Conference on New and Renewable Sources of Energy, Nairobi, August 1981.

Organizations responsible: Unesco, in close co-operation with other organizations of the United Nations system and with other intergovernmental bodies and with non-governmental organizations.
Participating countries: all Unesco Member States.

B. ACTIVITIES AT REGIONAL LEVEL

1. Title: Regional co-operation in technological research and higher education.

Principles of action: concentration on fields of priority importance for the region. Emphasis on manpower training. Close co-operation with other governmental and non-governmental organizations in all activities.

Main aims: to encourage research and development in various branches of technology and engineering, in order to contribute to solving problems of regional importance. To strengthen regional and national infrastructures and institutions for education and training of engineers and technicians.

Specific activities: support to the Association of Engineering Education in South and Central Asia (AEESCA) and Association of Engineering Education in Southeast Asia (AEESEA). Co-operation with the Colombo Plan Staff College for Technician Training in arranging training seminars and preparation of training material. Co-operation with the Pacific Science Association in housing and energy fields. Regional training seminars on modern analytic techniques for engineers. One seminar on preservation of stone monuments. Preparation of regional directories of professional societies, engineering

schools and technician training institutions. In co-operation with the Commonwealth Science Council, training workshops on standards and calibration will be held, and surveys of metrology facilities undertaken. Regional working groups on endogenous technology. Support to network activities between engineering schools. Regional professor exchanges. Support to regional meetings on environmental aspects of engineering education, education-industry co-operation and continuing education of engineers. Training workshops on maintenance and development of scientific instruments. Training seminars on biomass, mini-hydro power, energy requirements of human settlements, policy-making and other aspects of energy. Exchanges of university teachers in energy-related fields.

Background information: 20 C/5 Resolution 2/01.

Organizations responsible: Unesco, in co-operation with other United Nations organizations including ECWA and ESCAP, governmental organizations and regional non-governmental organizations.

Participating countries: all Unesco Member States in the Asia and Pacific region.

2. Title: Major regional project for the integration of technological research, training and development in Southeast Asia and the Pacific.

Principles of action: promotion of regional co-operation in solution of problems of regional importance, through working groups in specific fields that act as networks of co-operating institutions.

Main aims: to improve the capabilities and facilities for research and training in endogenous technology in engineering schools and research institutes in the region. To improve links between education and production.

Specific activities: these are concentrated in five priority areas and include training workshops, exchange of information, establishment of regional links, surveys, exchange visits, co-ordination and support of research, upgrading of teaching staff and technician training. The priority areas are appropriate technology for rural development, alternative energy sources, exploitation of rural and urban wastes, housing for low income groups, and maintenance and development of instrumentation.

Background information: 21 C/5 Resolution 2/01.

Organizations responsible: Unesco, in co-operation with the Federation of Engineering Institutions in Southeast Asia and the Pacific (FEISEAP), ESCAP, UNDP and other bilateral agencies.

Organizational machinery: the project is administered by the Unesco Regional Office for Science and Technology in Southeast Asia, assisted by an Advisory Group consisting of representatives from the participating Member States of the region.

Participating countries: all Member States in the Southeast Asia and Pacific sub-regional are eligible to participate in the activities of the project.

SECTION V
Ecological Sciences

A. ACTIVITIES AT WORLD LEVEL

Title: Man and the Biosphere (MAB).

Main aims: the main objective of MAB is to provide the scientific basis for the long-term use and conservation of natural resources to enable mankind to manage the natural resources of the biosphere more efficiently. To this end, the programme consists of networks of interdisciplinary field research and training activities in order to study and understand better the impact of man on the environment but also the impact of the environment on man, considered as a biological and adaptive entity and as a social, cultural and economic being. Such studies depend on close co-operation between natural and social scientists in the field.

Specific activities: the MAB programme includes the following fourteen major research themes:

MAB Project 1 - Ecological effects of increasing human activities on tropical and subtropical forest ecosystems;
MAB Project 2 - Ecological effects of different land uses and management practices on temperate and mediterranean forest landscapes;
MAB Project 3 - Impact of human activities and land use practices on grazing lands; savannah and grassland (from temperate to arid areas);
MAB Project 4 - Impact of human activities on the dynamics of arid and semi-arid zones' ecosystems, with particular attention to the effects of irrigation;
MAB Project 5 - Ecological effects of human activities on the value and resources of lakes, marshes, rivers, deltas, estuaries and coastal zones;
MAB Project 6 - Impact of human activities on mountain and tundra ecosystems;
MAB Project 7 - Ecology and rational use of island ecosystems;
MAB Project 8 - Conservation of natural areas and of the genetic material they contain;
MAB Project 9 - Ecological assessment of pest management and fertilizer use of terrestrial and aquatic ecosystems;
MAB Project 10 - Effects on man and his environment of major engineering works;
MAB Project 11 - Ecological aspects of urban systems with particular emphasis on energy utilization;
MAB Project 12 - Interactions between environmental transformations and the adaptive, demographic and genetic structure of human populations;
MAB Project 13 - Perception of environmental quality;
MAB Project 14 - Research on environmental pollution and its effect on the biosphere.

Project areas 1, 2, 3, 4, 5, 6, 7 and 11 have a specific geographic basis while the others relate to human intervention and other processes occurring in all parts of the biosphere; there is therefore an interaction between these two types of project areas.

In the coming years, most emphasis will be placed on five main kinds of environment:

- humid tropical ecosystems;
- arid and semi-arid ecosystems and marginal lands;
- human settlements;
- biosphere reserves;
- land-water interfaces.

Major regional projects are already being developed in the first two of these zones. It should be noted that research currently being carried out under the existing fourteen themes can, in most cases, be associated with one of the above priority areas.

To strengthen the research programme, MAB includes among its objectives the training of scientists and technicians willing and able to participate in multidisciplinary research teams. This is achieved by means of international and regional training courses, fellowships and exchanges of personnel with special emphasis on on-site training in places where MAB projects are already in progress.

Background information: MAB was officially launched in 1970 at the sixteenth session of the General Conference of Unesco and the broad outlines of the programme were established in November 1971 at the first session of the MAB International Co-ordinating Council which proposed thirteen projects areas for co-operative research. A fourteenth project, on environmental pollution, was added at the eighteenth session of the General Conference in 1974.

In Unesco's Medium-Term Plan for 1977-1982, objectives 7.2, 7.5, 7.6 and 7.7 cover the various aspects and activities of the MAB programme which correspond to 19 C/Resolutions 2.151, 2.152 and 2.153 and 20 C/Resolutions 2/7.2/1, 2.7/5.1, 2/7.6/1 and 2/7.7/1.

Linkages: endorsed by the United Nations Conference on the Human Environment, in Stockholm in 1972, MAB enjoys the continuing support of the United Nations Environment Programme (UNEP). The United Nations Specialized Agencies concerned (FAO, WHO, WMO) as well as the international scientific community, take part in its implementation. Among the internatinal non-governmental organizations, particularly IUCN and ICSU are consulted.

Organization: the MAB International Co-ordinating Council consists of scientific representatives from thirty nations, selected every two years by the Unesco General Conference, along with representatives from the above-mentioned United Nations and non-governmental organizations. It guides and supervises the programme. Unesco provides the secretariat.

In each country a National Committee defines and organizes research activities on particular national problems which relate to the international programme. Special ad hoc advisory panels and a number of temporarily appointed consultants help to co-ordinate national contributions and to define international core programmes, ensuring that compatible methodology is used for various projects. Thus countries work together on a series of ecological problems of common concern so as to provide comparable results capable of generalization and synthesis. Since the major focus of MAB projects is concerned with man's interactions with particular ecosystems or geographic units, much of this co-operative work is being developed at the regional and subregional levels. The programme is basically funded by participating countries themselves. Apart from Unesco's contribution, bilateral funds are the most important additional funding source for the programme activities. UNEP funds were also significant in the early stages of MAB.

Participants: as of July 1981, 102 countries have established MAB National Committees. Among the twenty-nine states of the Asia and Pacific region, twenty-three states have set up a MAB National Committee. They are listed in Table V.

Table V
Member States in Asia and the Pacific with MAB National Committees

Member States	No. of MAB research projects (as of July 1981)	No. of biosphère reserves
Afghanistan	-	-
Australia	63	11
Bangladesh	-	-
Burma	-	-
China	8	3
Democratic People's Republic of Korea	-	-
India	19	-
Indonesia	4	4
Iran	8	9
Japan	38	4
Malaysia	1	-
Mongolia	8	-
Nepal	2	-
New Zealand	3	-
Pakistan	3	1
Papua New Guinea	3	-
Philippines	13	1
Republic of Korea	6	-
Singapore	-	-
Sri Lanka	7	2
Thailand	7	3
Turkey	1	-
Union of Soviet Socialist Republics	242 (total in whole country)	6 (in Asian USSR)
Total for South and Southeast Asia and the Pacific	194 (plus those of the 242 USSR projects located in Asia)	44

B. ACTIVITIES AT THE REGIONAL LEVEL

MAB activities at the regional level fall into the major categories of institution building, research, promotion and co-ordination, information exchange through publications, symposia, workshops and seminars, and training activities of various kinds. The following activities indicate that countries in the region are playing an important role in the operational phase of the MAB programme:

(i) an International Centre for Integrated Mountain Development is being established in Kathmandu, Nepal, with principal support from Switzerland and the Federal Republic of Germany. It will initially be developed as a documentation centre for the region and will later itself undertake integrated research projects for mountain development;

(ii) a regional project entitled 'Applied Ecological Research, Training and Information for Natural Resources Development in the Humid Tropics of Asia', at present includes subprojects in India, Indonesia, Malaysia, Papua New Guinea, the Philippines and Thailand. Exchange of information and personnel between subprojects is encouraged and reginal meetings are held periodically;

(iii) comparative studies to characterize the soils of biosphere reserves in the region are being undertaken by a Unesco associate expert stationed in Jakarta. Reconnaissance missions have been taken to the Philippines, Thailand and Malaya, and field work has begun in an Indonesian biosphere reserve;

(iv) a biometeorological survey of Southeast Asia has been under way for some years. Compilation and synthesis of results will take place at a meeting in Paris in 1982;

(v) a regional network of studies of human settlements includes research projects in and around Lae in Papua New Guinea (studies of an urban hinterland and effects of rural electrification), Bangkok (suburban fringe effects) and Bali (energy, resource use and quality of life);

(vi) research in arid zones in one of Mab's priorities. In South Asia, a twenty-year synthesis of research results obtained by the Centre for Arid Zone Research in Jodhpur, India, is being prepared in 1981. An arid zone study tour and workshop is being held in Pakistan in 1981;

(vii) an integrated watershed land-use research and demonstration project in Waitaki, New Zealand, serves as regional focal point and demonstration area for similar research projects;

(viii) several publications from a 1974-1976 interdisciplinary project in the Pacific, 'Studies on population-environmental-resources relations in the eastern islands of Fiji', are currently being distributed internationally and translation into other languages is planned;

(ix) the following training courses were organized in the region during 1980-1981 either by MAB or with the support of MAB:
- Regional training workshop on integrated river basin management, Chiang Mai, Thailand, May-June 1981;
- Training course on the practical aspects of human ecology, Bagor, Indonesia, June 1981;
- Southeast Asia regional training course on human ecology, Samarinda, Indonesia, January-February 1980;
- BIOTROP (Bogor, Indonesia) conducts regular training courses in ecology and environmental science, e.g. conservation and utilization of forest genetic resources (1980); environmental science and management (1981); tropical forest ecology (1981);
- Option in watershed management, as part of a regional postgraduate training course in hydrology, Roorkee, India, nine months, annual;

(x) Unesco-MAB support is regularly given to international and regional meetings, generally to partially defray organizational, travel and printing costs. Recent examples include:
- MAB-IUFRO Symposium on Urban Forestry, Kyoto, Japan, September 1981;
- Pacific Science Association, International Congress on Pacific Basin Cities, Singapore, September 1981;
- Silver Jubilee Symposium, International Society for Tropical Ecology, Bhopal, India, October 1981;
- International Symposium on Erosion and Sediment Transport in Pacific Rim Steeplands, Christchurch, New Zealand, January 1981;

(xi) assistance may be provided for such publications as the proceedings of regional symposia or workshops, or the publication of newsletters and new periodicals. Recent examples include:
- the quarterly news bulletin of the International Society for Tropical Ecology, 'Wallaceana', printed in Malaysia;
- a new journal, 'Agrometeorology', published by the Indonesian Society for Agricultural Meteorology;
- Proceedings of the Internatinal Wetlands Conference, Delhi, India, 1980.

A network of biosphere reserves has been developed in South and Southeast Asia and in the Pacific region. The reginal network currently consists of forthy-four biosphere reserves in ten countries of the region. These reserves ensure *in situ* conservation of representative natural and semi-natural ecosystems, and provide permanent research sites for comparative studies of the structure, functioning and dynamics of natural and semi-natural ecosystems, as well as ecosystems heavily transformed by human impact. Biosphere reserves will also serve to monitor changes in the rural environment. Their educational function is also of outstanding importance.

As can be seen clearly from the above, regional MAB co-operatin involves different kinds of environmental studies and only a summary overview can be given here of the content of more than 200 MAB field research projects which are co-ordinated on a regional and subregional level and conducted in co-operation with relevant international organizations and national institutions.

An extensive information system has been developed for this region and other regions of the world, in order to bring about effective co-ordination and necessary exchange of data. In brief, this information system comprises: a computerized out-put of MAB field projects, regional newsletters, publictions of the MAB report and technical note series, publication by MAB National Committees, etc. Close links exist with developed contries, for example:

(i) seven postgraduate training courses in the field of integrated surveys, limnology, natural resources management, soil sciences and plant nutrition are annually offered by European countries, to specialists from the developing world. This training network is supported by Unesco, UNEP and other international organizations;

(ii) some industrialized countries have sponsored training courses in Asia, e.g. computer science (United Kingdom), tropical ecology (Federal Republic of Germany) and watershed management (United States of America);

(iii) assistance in the form of consultants from outside the region has been made available to national research projects, training institutions or conservation areas in most countries of the region. Short-term consultants can be made available through the MAB secretariat, Paris.

C. ACTIVITIES AT THE NATIONAL LEVEL (as of January 1979)

In view of the large number of national activities within the framework of the MAB programme, these have been summarized and presented under the preceding heading as regional and subregional activities. The number of MAB research projects in each country is given in Table V.

SECTION VI
Earth Sciences

A. ACTIVITIES AT WORLD LEVEL

1. Title: International Geological Correlation Programme.

Brief description: the programme is a co-operative effort between the International Union of Geological Sciences (IUGS) and Unesco, designated to encourage international research on geological problems related to the identification and assessment of natural resources and the improvement of man's environment.

It is a multinational, multidisciplinary programme that now (1981) includes fifty-one research projects of which seventeen are in Programme Division 1 (Time and Stratigraphy); eighteen in Division 2 (Major Geological Events in Time and Space and their Implication in Environmental Processes); twelve in Division 3 (Distribution of Mineral Deposits in Space and Time and Relation of the Processes of Ore Formation to Other Events in Earth History); and four in Division 4 (Quantitative Methods and Data Processing in Geological Correlations).

Principles of action: to carry out internationally co-ordinated research on selected topics (projects) related to the abovementioned domains, to exchange scientific information and experience, to train young specialists, especially from developing countries, through project working group meetings, workshops, seminars and symposia.

Main aims:

(i) to assist in obtaining answers to interrelated theoretical and practical problems in the geological sciences, through international co-operation;

(ii) to help locate, through improved geological knowledge and prospecting methods, new mineral and energy resources;

(iii) to develop worldwide standards and nomenclature for defining the relationship between rock units and geological time;
(iv) to refine and geographically broaden the application of new research tools and methods to help solve fundamental problems in geological correlation.

The programme has come to have a strong emphasis on the tranfer of scientific knowledge and research techniques to developing countries.

Specific activities and achievements:
(i) scientific meetings of project working groups, workshops and seminars, which are being most successfully organized by IGCP project leaders, are constantly encouraged and supported as effective mechanisms for the dissemination of new scientific information and techniques and for training. With Unesco's financial support, forty-seven meetings, seminars and workshops have been organized in various parts of the world in 1981. A similar magnitude of activity is planned for the next years of the triennium;
(ii) the considerable effectiveness of the programme is proved by the constant flow of scientific publications resulting from or related to IGCP projects. In 1981, some 1,200 items have been published, among which are such fundamental monographs as 'Earth's Pre-Pleistocene Glacial Record', Cambridge University Press, comprising 1,004 pages and to which 165 authors have contributed.

Current informatin about the programme and projects is published in the series 'Geological Correlation' and in the quarterly journals 'Nature and Resources' and 'Episodes' (of IUGS).

Background information: in November 1966, the Unesco General Conference supported geological correlation as a key element of its earth science programme. In October 1967, the principle and statutes of the programme were elaborated by the IUGS/Unesco Ad Hoc Committee in Prague. The scientific content of the programme and ways and means of carrying it out were developed by a meeting of experts in Budapest in 1969. On the basis of a report of the Intergovernmental Conference of Experts for Preparing an International Geological Correlation Programme, held in October 1971 and its recommendations (document 17 C/66), the General Conference of Unesco approved the programme at its seventeenth session in November 1972 (resolution 2.313).

Organizations responsible: the programme is a joint enterprise of Unesco and the International Union of Geological Sciences (IUGS).

Organizational machinery: the development and management of the programme are the responsibility of the IGCP Board, which draws on the evaluations and recommendations of the Scientific Committee. Four board members out of fifteen have been appointed from the region, as well as five scientists out of twenty on the Scientific Committee. The co-ordination of the programme and maintenance of liaison with national and international bodies concerned with the IGCP are ensured by the IGCP secretariat which also acts as a secretariat for the IGCP Board and as a receiving office, clearing house and distribution centre for all IGCP matters.

Participating countries: there are at present seventy-six National Committees for the IGCP and thirty-five official contacts, bringing the total number of Member States involved in the programme to 111, including twenty-four countries from Asia and the Pacific, i.e. all countries of the region with the exception of:

- Democratic Kampuchea,
- Democratic People's Republic of Korea,
- Maldives,
- Samoa and
- Tonga.

Scientists from the region participate in some of the thirty-nine ongoing projects, ten of which are led by scientists from Asia and Oceania, namely:

Project 32 'Stratigraphic correlations between sedimentary basins in the ESCAP region';
Project 41 'Neogene-Quaternary boundary';
Project 91 'Metallogeny of the Precambrian';
Project 106 'Permo-Triassic stage of geological evolution';
Project 111 'Genesis of manganese ore deposits';
Project 114 'Biostratigraphic datum-planes of the Pacific Neogene';
Project 129 'Lateritization processes';
Project 154 'Global exchange and processing of information in geochemistry';
Project 160 'Precambrian exogenic processes';
Project 166 'Correlation of coal-bearing formations'.

Moreover, an important project is being executed in the region, namely IGCP Project 30 'Circum-Pacific plutonism'.

2. Title: Feasibility study on the creation of international experimental sites for earthquake prediciton research.

Brief description: selection of experimental sites throughout the world and define techniques for the experiments.

Principles of action: investigation of the desirable geotectonic conditions for the experimental sites and approach to possible host governments.

Main aims: provide a situation for a broad participation by different teams studying in earthquake prediction area.

Specific activities and achievements: advisory missions and working group meetings.

Background information: a recommendation on international experimental sites for research on earthquake prediction was made by the Panel of Experts on the Scientific, Social and Economic Aspects of Earthquake Prediction held in 1979. The proposal was approved by the twenty-first session of the General Conference of Unesco.

B. ACTIVITIES AT REGIONAL LEVEL

1. Title: Regional seismological programme for the Anatolian-Zagros-Hindu-Kush-Karakorum-Himalayan-Arakan ranges.

Brief description: programme for assessment and mitigation of earthquake risk in the region.

Principles of action: define the needs of the region and implement the project in appropriate phasing.

Main aim: establishment of seismological networks and research institutions.

Specific activities and achievements: meetings, missions, training courses, fellowships and equipments. A meeting was called by Unesco in 1980 to discuss further the setting up of a regional project for the above-mentioned region. Following the meeting, a project document was prepared and the project will be launched in 1982.

Organizations responsible: Unesco as executing agency and UNDP.

Participating countries: Afghanistan, Burma, India, Iran, Nepal and Turkey.

2. Title: Regional Seismological Network in Southeast Asia - UNDP/Unesco Project (RAS/71/237)

Brief description and main aims: situated at the intersection of the earth's two major earthquake systems, Southeast Asia is one of the most seismically active areas in the world. Because of the heavy populatin density of this region, there is a high degree of earthquake risk to human life and investments in buildings, plants and equipment. Unesco focused attention on this problem through a five-man mission to the area in 1960, another mission in 1968, and a meeting of seismologists from Southeast Asia held in 1969. The meeting recommended a reginal project for funding by the United Nations Development Programme (UNEP), which UNDP accepted 'in principle'. UNDP finally approved the project in August 1974, after having provided one year of 'preparatory assistance'.

The objective of the project was to reorganize, strengthen, and expand the seismological observatory networks in the participating countries of Southeast Asia on a regional basis, and to promote the development of the facilities necessary for solid regional co-operation. With this infrastructure in full operation the governments of the co-operating countries could expect to receive the basic data on earthquake risks and thus be in a position to elaborate measures for protection against earthquakes.

Including the one-year preparatory assistance phase, the project had a duration of approximately six years, from November 1973 to 30 September 1979. Unesco executed the project in co-operation with the following governmental departments and services:

- Institute of Meteorology and Geophysics
  Department of Communications
  Jakarta, Indonesia
- Malaysian Meteorological Service
  Kuala Lumpur, Malaysia
- Philippines Atmospherical, Geophysical and Astronomical Services Administration (PAGASA)
  Department of National Defence
  Manila, Philippines
- Meteorological Department
  Ministry of Communications
  Bangkok, Thailand
- The Royal Observatory
  Hong Kong

For the implementation of the project, the UNDP contributed US $1,210,727 and the co-operating government agencies provided a total of the equivalent of US $1,300,000.

Specific activities and achievements: in its organization, the project had one full-time expert, the Project Manager. The remainder of project funds for international experts (fifty-eight man/months) were used for eight consultants who visited the network stations when their assistance was most timely and useful. The consultants came from: Australia, Canada, India, the Philippines and the United States of America; they specialized in the fields of network planning, field testing, seismic instrumentation, seismic computations, strong-motion seismology, seismic regionalization, and geophysical education.

Each participating country contributed an essential core of counterpart staff that took part in regional tours of the project centres, benefited from on-the-job training, and carried out special studies under fellowships.

Through the activities of the project, the respective government agencies reorganized the existing seismological centres in the Philippines, Indonesia and Thailand, and established a new centre in Malaysia. The resulting 'Network' consists of fifty-one seismic stations (seismographs) includes twenty-seven stations provided from project funds, seventeen stations provided from government funds, and seven 'Worldwide Seismic Stations' that were integrated into the network. The participating governments will increase the number of stations to sixty-three when acquisitions actually under consideration will have been delivered.

The project was also responsible for the installation of thirty-six strong-motion accelerographs in the participating countries. Of these instruments, the project paid for twenty-one and the governments paid for fifteen.

During the life of the project, UNDP and the respective governments provided the following funds for equipment purchases:

	UNDP/Unesco purchases	Government purchases
Philippines	US $143,028	US $130,000
Thailand	31,186	7,290
Malaysia	30,570	44,085
Indonesia	173,681	76,170
Hong Kong	81,336	4,995

As a result of the project, the stations making up the network are equipped with basic equipment such as: seismometers, Sprengnether (UN/A and UN/B) timing systems; UN/A and AS 330 seismic amplifiers; microwave links; Kinemetrics portable seismographs; radio receivers; and SMA-1 Kinemetrics strong-motion accelegrographs. Each station also has a two-year supply of spare parts and materials for its operation and maintenance.

Towards resolving the complex problem of data handling, the project produced computer programmes to locate and evaluate epicentres and to store data, and wrote manuals for computer operation, correspondign to the different computers in use in the five countries. The experts, consultants and the counterpart staff also organized on-the-job training in the operation and manipulation of computer programmes. In addition, the International Seismological Centre in Edinburgh made available to the project copies of a magnetic tape catalogue listing all the earthquakes in Southeast Asia between 1906 and 1976.

Given the primordial importance of regular, efficient data exchange, the project devoted much time and care to the development of a workable system for the rapid exchange of data among the centres of the network and between the network and the International Seismological Centre and the National Earthquake Information Service of the United States Geological Survey. After experimenting with various systems, the project resolved this key problem by obtaining access to the telecommunications system of the United States Department of State.

Under the project, the network also began publishing a 'Newsletter' for the exchange of information and the promotion of research.

Throughout its duration the project gave much attention to training, with a view to making each country self-sufficient in the operation of the seismic centres and to ensure the continuous operation of the network.

Project follow-up: at its final meeting in September 1979, the Project Co-ordinating Committee recommended the establishment of a 'Southeast Asia Association of Seismology and Earthquake Engineering', with the Association of Southeast Asian Nations (ASEAN), but open to observes from non-ASEAN nations. The committees proposed that the association have six general aims:

(1) the continued operation of the seismological and strong-motion network;
(2) the fullest utilization of the data deriving from the networks for research;

(3) the first-hand study of areas affected by earthquakes and tsunamis;
(4) the exchange of information, through meeting and a newsletter;
(5) the solicitation and receipt of funds and other forms of assistance; and
(6) co-operation with other regional and national organizations for seismology and earthquake engineering.

The committee also noted, with appreciation, a proposal for a new programme in seismology and earthquake engineering to be sponsored by USAID, with ASEAN.

3. Title: Regional Programme for Research and Training in Volcanology.

Brief description: establishment of a regional project for training and research in volcanology.

Specific activities: missions of experts and organization of meetings.

Background information: the history of the idea starts from the Grenoble resolution in 1975 through a Unesco meeting in November 1979 and the IUGS resolution made in Canberra in 1979.

Participating countries: countries of the Southwest Pacific region.

4. Title: Postgraduate training course on applied geophysics. Hyderabad, India.

Brief description: training on geological and geophysical exploration for minerals, groundwater, or engineering geology. The course is destined for in-service personnel associated with geological and geophysical programmes.

Specific activities and achievements: training of about ten specialists every year. The training course is organized yearly.

Organization responsible: National Geophysical Research Institute of the Council of Scientific and Industrial Research, Hyderabad, India.

5. Title: Regional Network for Geosciences in Southeast Asia.

Brief description and main aims: in 1974, Unesco convened the first of a series of meetings on regional co-operation in the basic sciences in Southeast Asia, which eventually led up to the formal establishment of the network at a meeting held in Seoul in October 1977. As conceived by its founders, who were from Australia, Indonesia, Japan, the Republic of Korea, Malaysia, the Philippines, Singapore, Thailand and Hong Kong, the purpose of the network is to forge links between institutions and individuals working in the geosciences in Southeast Asia, in order to build up a strong, endogenous scientific structure that would serve as a foundation for the application of science to development.

The founding members also adopted three principles to govern the geoscience network, namely:
(i) the major objective shall be to improve national facilities and capabilities through regional co-operation;
(ii) all activities shall be based on existing institutions and facilities; and
(iii) participating scientists shall determine the policies and programmes of the network.

Structure: the structure of the network is designed to ensure the maximal participation of persons actively engaged in the geosciences; it consists of:
(i) national networks of participating institutions;
(ii) a national point of contact in each country;
(iii) a regional network headquarters with an executive secretary; and
(iv) a regional co-ordinating board composed of all the national points of contact.

Specific activities and achievements: the network has organized the following activities since October 1977:
- First Meeting of the Regional Co-ordinating Board, Seoul, Republic of Korea, 20 October 1977;
- Second Meeting of the Regional Co-ordinating Board, Bangkok, Thailand, 11-13 November 1978;
- Workshop on Coastal Geomorphology, Singapore and Malaysia, 27 August-2 September 1979;
- Workshop on Philippines Porphyry Copper Deposits, Manila, 22-24 October 1979;
- Third Meeting of the Regional Co-ordinating Board, Paris, 16 July 1980;
- Workshop on Age Dating, Seoul, Republic of Korea, 6-12 October 1980.

In addition the Network Headquarters compiled and distributed the following documents:
- 'Regional Meeting on Co-operation in Geosciences (Final Report), Seoul, Korea, 17-20 October 1977';
- 'Newsletter, Regional Network for Geosciences in Southeast Asia':
  Vol. 1, No. 1, June, 1978, Seoul, Korea;
  Vol. 1, No. 2, December 1978, Seoul, Korea;
  Vol. 2, No. 1, August 1979, Seoul, Korea;
  Vol. 2, No. 2, December 1979, Seoul, Korea;
  Vol. 3, No. 1, August 1980, Seoul, Korea;
  Vol. 3, No. 2, December 1980, Seoul, Korea.

Under the network 'Exchange Programme' three geoscientists carried out study visits:
- a geologist from the Universiti Saints Malaysia (Penang, Malaysia) who visited the Earthquake Research Institute at the University of Tokyo from 14 May to 12 June 1980;
- a geologist from the Geological Research and Development Centre (Bandung, Indonesia), who visited the Korea Research Institute of Geosciences and Mineral Resources in Seoul Age-Dating Methods, from 4 to 26 October 1980;
- a geologist from Kyungpook National University (Daegu, Republic of Korea), who will take up a visiting professorship in the 'Fission Track Laboratory' at the University of Melbourne, Australia, from 20 July 1981 to 20 July 1982.

Participants: Currently the network is composed of institutions and scientists in: Australia, Indonesia, Republic of korea, the Philippines, Thailand, Hong Kong, Malaysia and Singapore. Unesco is an *ex-officio* member.

6. Title: Postgraduate training course on geothermal energy. Kyushu, Japan.

Brief description: training on the development and use of wet steam of the volcanic type.

Main aim: improve participant's knowledge of geothermal energy.

Specific activities and achievements: training of about twenty specialists every year. The course is organized yearly since 1969 by the Government of Japan.

C. ACTIVITIES AT NATIONAL LEVEL

Title: USGS/Unesco Training Seminar on Mineral Resource Assessment in Beijing, China.

Brief description: introduction of advanced knowledge and techniques in mineral resource assessment by means of large computer.

Principles of action: high level transfer of know-how.

Main aims and specific activities: improve Chinese geoscientists' knowledge of mineral resource assessment based on data handling techniques. The seminar (8-20 June 1981) was attended by forty-five Chinese experts. Among five instructors, four came from the United States of America and one from Japan. Very satisfactory results were achieved.

Organizations responsible: Chinese Academy of Geological Science, Ministry of Geology, China, with the co-operation of the United States Geological Survey.

SECTION VII
Water Sciences

A. ACTIVITIES AT WORLD LEVEL

Title: Water Resources Programme.

Principles of action: the main courses of action which are complementary are:
- the stimulation and co-ordination of studies concerning the assessment, exploitation, conservaton and management of water resources through the International Hydrological Programme;
- the promotion and improvement of methods of teaching the water sciences and water engineering and the development of training in this field;
- the promotion of regional co-operation through support to regional co-operative activities;
- the strengthening of the capacity of Member States to assess their water resources and to manage them on a scientific basis through technical assistance.

The International Hydrological Programme (IHP) is focused on the scientific and educational aspects of hydrology and has the following basic objectives:
(i) to provide a scientific framework for the general development of hydrological activities;
(ii) to improve the study of the hydrological cycle and the scientific methodology for the assessment of water resources throughout the world, thus contributing to their rational use;
(iii) to evaluate the influence of man's activities on the water cycle, considered in relation to environmental conditions as a whole;
(iv) to promote the exchange of information on hydrological research and on new developments in hydrology;
(v) to promote education and training in hydrology;
(vi) to assist Member States in the organizing and development of their national hydrological activities.

The IHP is executed through medium-term successive phases of a duration of six years. Exceptionally, the second phase of the IHP will have a duration of three years (1981-1983).

The contents of each phase are determined by the General Conference in accordance with the general objectives of the IHP and following recommendations adopted by ad hoc intergovernmental conferences at which all Member States are represented.

Such a conference, organized jointly by Unesco and the World Meteorological Organization (WMO), took place in August 1981 in order to determine the contents of the third phase of the IHP (1984-1989).

The IHP is a long-term intergovernmental programme which aims to promote international co-operation with regard to water resources. It is a hydrological programme centred first of all on a study of water resources and their interaction with the natural environment and human society. It is also concerned with the applications of hydrology to the pratical problems of water use.

Main aims:
(i) to improve the evaluation of potential water resources;
(ii) to improve the planning of water management;
(iii) to evaluate the influence of human activities on the water cycle;
(iv) to promote education in hydrology;
(v) to assist Member States in developing their hydrological activities.

Specific activities:
(i) activities undertaken as part of the IHP consist principally of:
- ensuring the participation of Member States in the IHP by establishing national committees, by developing national and regional hydrological programmes and by setting up working groups or nominating rapporteurs;
- the execution of research projects and the publication of technical reports and guides on methods concerning:
  - computing and determining water balances and their elements at national,regional and international level;
  - the characteristics of the water cycle and the hydrological regime;
  - evaluation of changes in the water cycle and the hydrological regime as a result of man's activities, and their impact on the environment;
- the organization of training courses, symposia and workshops, the reports and conclusions of which are published;
- the organization of regional meetings of members of the national committees so as to adapt t he contents of the IHP to the needs of each region and to develop regional co-operation;

(ii) multidisciplinary studies and the development of new methods of analysis and prediction concerning:
- the optimization of water systems;
- the development of water resources;
- the social and economic aspects of water management in urban environments;
- hydrological and ecological aspects of water pollution;
- effect of urbanization on the hydrological regime and on water quality;
- long-term regime of groundwater;
- rational water management;

(iii) assistance to Member States, particularly developing countries, with regard to:
- the organization and implementation of training and research programmes in the field of water resources;
- improvement of their training, study and research facilities in this field.

Achievements: the first phase of the IHP came to an end in 1980. The evaluation of its results, carried out in August 1981 (report of the International Conference on Hydrology and the Scientific Bases for the Rational Management of Water Resources-not yet published), showed the progress which it had made possible in scientific knowledge, the practical training of hydrologists, international and regional cooperation in hydrology and the expansin of hydrological activities in developing countries. The programme had been specially directed towards meeting the needs of these countries. Shortcomings were nevertheless noted, particularly with regard to the application of scientific advances, at the international level, to solve the practical problems of developing countries. The main

results are the scientific outcome of symposia, seminars, training courses and the publication of scientific works. Most of the publications have been issued in English and are thus easily accessible in the region. Some fifteen training courses provide for the training of some 150 students from developing countries.

Background information: the basic documents are the 21 C/5, Chapter 2, objective 7.3, paragraphs 2493-2591, and the report on the third session of the Intergovernmental Council of the IHP, Paris, November 1979, Unesco document SC/MD/66.

Organization responsible: Unesco.

Organizational machinery: the organization of the IHP.

(i) *IHP Intergovernmental Council*
The role of this council is to ensure the unitary planning and co-ordinated implementation of the programme. It is composed of representatives from thirty Member States of Unesco; fifteen new members are elected by the General Conference of Unesco every two years. It is assisted in its work by:
- committees composed of representatives of the Member States, responsible for preparing recommendations on the implementation of some of the programme's major aspects;
- working groups composed of specialists working in a personal capacity and responsible for studying individual projects.

(ii) *IHP National Committees*
These Committees have to prepare the programmes of participation of their respective countries in the IHP and supervise the implementation of these programmes. They may also act as the national co-ordinators of the Hydrological activities of their respective countries.
IHP Regional Committees may be established at the initiative of Member States in a region who have similar hydrological interests.

Participants:
- all Member States of Unesco. Participation in the IHP is at present as follows: Permanent National Committees for the IHP, including from Asia and the Pacific: Australia, Bangladesh, China, Democratic People's Republic of Korea, India, Indonesia, Iran, Japan, Republic of Korea, Malaysia, Mongolia, Nepal, New Zealand, Pakistan, Papua New Guinea, the Philippines, Singapore, Sri Lanka, Thailand, USSR.
- Appropriate organizations of the United Nations system such as ESCAP, UNEP, WMO, FAO, WHO and IAEA.
- Non-governmental organizations such as ICSU, IAH, IAHR, IAHS, ICID and ICOLD.

Participating countries: 126 countries have established National Committees, twenty of which are located in Asia and the Pacific. Five of them are represented on the Intergovernmental Council of the IHP which consists of, in total, thirty countries.

Reference to projects:

Project A: to increase the capacity of Member States to apply advanced methodologies and technologies to the assessment, development and management of their water resources through a scientific programme aimed at the improvement of the understanding of hydrological processes and the encouragement of research and the dissemination of its results among Member States.

Project A.1: to encourage studies in hydrological processes with a view to improving the representation of the hydrological regime and the assessment of water resources (twenty-seven subprojects).

Project A.2: to stimulate and co-ordinate studies involving the application of various techniques for the determination of hydrological parameters and water balances for the purpose of water resources planning, project design and management (fifteen subprojects).

Project A.3: to stimulate and support studies concerning the determination and prediction of the influence of man's activities on the hydrological regime and the interactions of these activities with the environment (eleven subprojects).

Project A.4: to promote studies leading to the development of procedures for the regional and integrated assessment of water resources and their management to meet social and economic needs (nine subprojects).

Project B: educational projects - to develop education and training programmes with the aim of increasing the capability of Member States to assess, develop and manage their water resources.

Project B.1: to prepare guidance material for the training at national level of technicians in hydrology and water resources and to establish training courses for teachers of technicians (five subprojects).

Project B.2: to encourage and assist in the preparation of teaching aids and the use of modern teaching methods at undergraduate and postgraduate level (six subprojects).

Project C: public information - to encourage and promote, by appropriate means, an increasing awareness and appreciation of the relevance and importance of water resources on the part of planners and policy-makers in Member States, in general, and in developing countries, in particular.

Project D: projects related to the strengthening of national infrastructures and to the development of an information system in the field of water resources - to promote the establishment and improvement of national infrastructures by Member States for the preparation of national water policies, for water resources development and for rational water management (two subprojects).

B. ACTIVITIES AT REGIONAL LEVEL

At the regional and subregional levels, co-operation is continuing in groups of countries within the framework of the IHP, e.g.:

(i) several regional and subregional meetings have been organized up until 1980 and will be organized in 1981-1983, particularly on the Indian subcontinent. The Asian Regional Co-ordinating Committee on Hydrology (ARCCOH) is functioning well as a subregional body for the co-ordination of meetings, the dissemination of information and assistance in training activities;

(ii) the Unesco Regional Offices of Science and Technology in New Delhi and Jakarta have been helpful in establishing links between the global IHP and regional programmes; regional hydrologists co-ordinate regional activities;

(iii) permanent postgraduate courses in hydrology are organized in Roorkee (India) and Monash University (Australia).

New programmes in 1981-1983 at regional level

(i) A regional workshop on the hydrology of snow, ice and graciers will be held in Pakistan in 1982.

(ii) In collaboration with WMO, a regional technician training course will be held in Nepal in 1981-1982. This course will be repeated in Sri Lanka.

(iii) Unesco will support an ICID training course on the application of systems analysis to the problem of water resources management (1981-1982).

(iv) Unesco will support an IAEA training course on the use of nuclear techniques in Sri Lanka in 1981.

(v) A subregional workshop, supported by Unesco and organized by the Graz (Austria) training course on groundwater tracing techniques will be held in Malaysia in early 1983.

(vi) A regional seminar on the hydrological impact of forest management practices, especially reafforestation was held by Unesco in Malaysia in 1981.
(vii) A regional training course on groundwater was held by Unesco at the AIT, Bangkok, in 1981.
(viii) A regional training seminar on flood forecasting and control will be organized jointly by Unesco and WMO in Pakistan in 1981.
(ix) A project on flood protection and control of the lower Brahmaputra river is under consideration.

C. ACTIVITIES AT NATIONAL LEVEL

Only those national activities are referred to here which are being held under the auspices of the IHP.
(i) A pilot project on the hydrological aspects of waste disposal is being developed and will be executed in 1982-1983 in India.
(ii) Thailand is planning to hold biannually workshops on water resources management and environmental monitoring of humid-tropical ecosystems.
(iii) A hydrological glossary in the Indonesian and Malaysian languages is being compiled.
(iv) A project on roof runoff is being implemented in Indonesia; in the same country, studies have been supported on the control of water weeds, and a 'Project on the relationship between solar radiation, evapotranspiration and sunshine duration'.
(v) India is considering the establishment of a second postgraduate training course in hydrology.

National activities include hydrological studies, studies of water balances, snow hydrology, water pollution monitoring and groundwater networks, data computation for water projects, education and training, and seminars. Increasing exchange of national experiences for the benefit of the hydrological community in the region is encouraged. The Unesco regional hydrologists assist in the implementation of these projects.

SECTION VIII
Intergovernmental Oceanographic Commission's (IOC) Programme

A. ACTIVITIES AT WORLD/REGIONAL LEVEL

Title: Marine sciences (Intergovernmental Oceanographic Commission).

Main aim: to promote scientific investigation with a view to learning more about the nature and resources of the ocean through the concerted action of its members (Article 1.2 of the IOC Statutes).

Specific activities:

1. At world level

(i) Global Investigation of Pollution in the Marine Environment (GIPME):
  (a) studies and international meetings on the entry, distribution and transfer processes of pollutants;
  (b) basic regional studies on the levels of the most important pollutants in each ocean region and in each element (water, organisms, sediments, atmosphere) of the marine environment; co-operation in the implementation of the UNDP Mediterranean Action Plan;
  (c) studies on dose/response relationships and on methods used to assess marine pollution (preparation of standards and methods of analysis) with a view to regulatory and monitoring activities;
  (d) development and trial of models based on observational data collected.
(ii) International Oceanographic Data Exchange (IODE):
  (a) preparation of international guides and handbooks, and standardized formulae for recording and encoding data;
  (b) the establishment of a Marine Environmental Data and Information referral system (MEDI);
  (c) development, in conjunction with FAO, of an Aquatic Sciences and Fisheries Information System (ASFIS);
  (d) provision of assistance for the development of national centres for the collection of oceanographic data, particularly in the developing countries.
(iii) Integrated Global Ocean Services System (IGOSS):
  (a) development:
    - of an IGOSS observation system;
    - of telecommunications apparatus;
    - of meteorological, oceanographic and marine observation techniques;
    - of a marine pollution monitoring programme;
    - of data exchange and archiving;
    - of a related education and training programme;
  (b) assistance to regional ocean monitoring programmes;
  (c) assistance with the training of specialists in developing countries and with the various aspects of work undertaken as part of IGOSS.
(iv) Training, Education and Mutual Assistance (TEMA):
  (a) evaluation of the resources and needs of Member States with regard to facilities, equipment and staff for training;
  (b) establishment, co-ordination and evaluation of training, education and mutual assistance programmes.

2. At regional level

It is mainly as part of the activities of the Intergovernmental Oceanographic Commission (IOC) that regional co-operation in marine sciences is being developed: through its Programme Group for the Western Pacific (WESTPAC), IOC, among other things, plans, promotes and co-ordinates specific regional programmes of marine research, ocean services and related activities in the region, in conformity with the objectives of the Commission and the priorities of the countries of the region. It co-operates, for instance, with:
(i) FAO's Indo-Pacific Fisheries Council (IPFC) and the Southeast Asian Fisheries Development Centre (SEAFDEC);
(ii) UNEP in the implementation of relevant parts of its Regional Seas Action Plans, and in particular the UNEP Action Plan for the East Asian Seas, and by taking other pertinent supporting measures;
(iii) the two Committees for Co-ordination of Joint Prospecting for Mineral Resources in Asian and South Pacific Offshore Areas (CCOP and CCOP/SOPAC) of the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP);
(iv) CCOP in the Joint CCOP-IOC Working Group on Post-IODE Studies on East Asia Tectonics and Resources (SEATAR), etc.

IOC Member States (particularly the industrialized countries of WESTPAC) actively supported the programmes adopted by the Programme Group at its first session (WESTPAC-I, Tokyo, February 1979) in various ways, e.g.:
(i) the Federal Republic of Germany provided US $47,000 to the IOC Trust Fund for the Regional Advanced Biological Oceanographic Training Course, held in San Carlos University, the Philippines, in March/April 1981, and the Government of Japan announced an additional US $30,000 for training of scientists and for other supporting activities of WESTPAC;

(ii) other forms of support to WESTPAC activities, mainly in the form of hosting of meetings and/or sponsorship of participants to such meetings, has been received from (in alphabetical order) Australia, France, Japan, the Philippines, United Kingdom and United States of America.

Main achievements:
- with logistic and financial support of Japan, three scientific workshops called for by WESTPAC-I were successfully convened in Tokyo;
- IOC co-operated with CCOP/SOPAC and France in convening the CCOP/SOPAC-IOC Second International Workshop on Geology, Mineral Resources and Geophysics of the South Pacific, in Noumea, New Caledonia;
- with the support of Japan, the Philippines, Union of Soviet Socialist Republics and United States of America, the ad hoc Task Team on Marine Pollution Monitoring using Commercially Exploited Shellfish as Determinants held its first meeting in Manila in January 1981;
- the Joint CCOP-IOC Working Group on Post-IDOE Studies on East Asia Tectonics and Resources (SEATAR) held its sixth session in Bangkok in conjunction with the 17th session of CCOP;
- under the IOC programme on Training, Education and Mutual Assistance (TEMA) in the marine sciences:
  - IOC, jointly with the Australian Department of Science and Environment, organized a training course on petroleum monitoring in the Indian ocean region, Perth, 18 February-1 March 1980;
  - IOC, jointly with the Division of Marine Sciences of Unesco and in collaboration with the Australian National Commission for Unesco, held a Regional Training Course for Marine Science Technicians at the Institute of Marine Science, Cape Ferguson, Australia;
- with a contribution from the Federal Republic of Germany to the IOC Trust Fund, IOC jointly with the Division of Marine Sciences, organized a training course on biological oceanography, at San Carlos University in the Philippines;
- as part of WESTPAC activities, the Ocean Research Institute of the University of Tokyo organized two cruises in which scientists from the region were invited to participate. Three scientists from Hong Kong, the Philippines and Indonesia participated in the first cruise, and six more are expected to participate in the second cruise, with support from IOC, utilizing part of the funds contributed by the Government of Japan to the IOC Trust Fund.

Other activities included:
- missions to the Indo-Pacific region of CASTASIA, mainly in the framework of TEMA and IGOSS;
- submission to UNDP of three regional/interregional project proposals to enhance the marine science capabilities of developing Member States and regional co-operation;
- convening of the second session of the IOC Programme Group for the Western Pacific (WESTPAC-II, Jakarta, October 1981), at which major decisions regarding the future scientific programmes and regional co-operation in marine sciences in the region were taken.

Background information:
- IOC Technical Series No. 20;
- 20 C/Resolutions 2/7.4/1-4 in Unesco's Approved Programme and Budget for 1979-1980 (document 20 C/5);
- 21 C/Resolutions 2/01, 01, 06, 08 in Unesco's Approved Programme and Budget for 1981-1983 (document 21 C/5).
- Establishment of IOC at the eleventh session of the General Conference of Unesco in 1960 (resolution 2.31).
- Establishment of WESTPAC at the tenth session of the IOC Assembly (IOC resolution X-11A).
- Unesco's Medium-Term Plan for 1977-1982, objective 7.4.

The organization of IOC:
- the Assembly, the Executive Council (both decision-making) and the Secretariat (jointly with other United Nations agencies) located in Unesco;
- subsidiary bodies: working committees, programme groups, working groups and international co-ordination groups (one IOC regional association).

Participants: membership in accordance with Article 4.1 of the IOC Statutes ('Membership of the Commission shall be open to any Member State of any of the Organizations of the United Nations system').

Participation in IOC is at present as follows: 104 Member States (including the following states of Asia and the Pacific: Australia, China, Democratic People's Republic of Korea, India, Indonesia, Iran, Japan, Malaysia, New Zealand, Pakistan, the Philippines, Republic of Korea, Singapore, Socialist Republic of Viet Nam, Sri Lanka, Thailand, Tonga, Turkey and Union of Soviet Socialist Republics); the United Nations organizations which are members of the Inter-Secretariat Committee on Scientific Programmes Relating to Oceanography (ICSPRO), i.e. the United Nations, Unesco, FAO, WMO, IMCO and other appropriate non-governmental organizations, e.g. the Scientific Committee on Oceanic Research (SCOR) of the International Council of Scientific Unions (ICSU).

SECTION IX
Marine Sciences Programme

A. ACTIVITIES AT WORLD LEVEL

Title: Major Interregional Project for Research and Training in view of the Integrated Management of Coastal Systems (COMAR).

Brief description: COMAR is one of the 'Major Projects' of Unesco. It concentrates on the coastal environment, the socio-economic and scientific importance of which has been increasingly appreciated during recent years in coastal countries, developing and developed alike. The understanding of the functioning of coastal systems, however, is not only relatively sparse and fragmentary, but lagging behind the scientific knowledge of the adjacent terrestrial and marine ecosystems.

Principles of action: the need for a sound management of the coastal environment and its resources, requires proper understanding of this environment and of the functioning of its various systems, including their responses to the impact of man's use on them. During the initial stage of COMAR, the main systems, such as mangroves, coastal lagoons, estuaries, coral reefs, etc., are considered separately in view of the great complexity of the coastal environment, the scarcity of means and the need to consider various aspects in depth. Besides reviewing and tempting to synthesize the scattered existing knowledge, the project promotes further research activities of these systems, especially on a regional basis to secure a firm basis for the needed management guidelines and programmes.

Main aims:
(i) to assist Member States in:
  (a) defining their needs and priorities regarding the coastal environment, research and management;
  (b) acquiring and completing the necessary scientific knowledge on the functioning of the natural coastal systems and on the consequences of impacts from socio-economic origin;
  (c) training teams of specialists as needed, and acquiring the necessary manpower and supporting facilities;
(ii) to develop in the different regions field programmes responding to the different needs for surveys, research and training concerning scientific research and management policies and guidelines, including the need for public information.

Specific activities and achievements: (in or of relevance to Asia and the Pacific region)

(i) finalization, and endorsement by Member States, and UNDP approval of the 'Training and Research Pilot Programme on the Mangrove Ecosystems of Asia and Oceania'. The operational activities start in 1982. Further details are given in Part B.2 below;
(ii) Seminar on Marine and Coastal Processes in the Pacific (ecological aspects of coastal zone management), held at Motupore Island Research Centre, Papua, New Guinea, July 1980. The report of this meeting is published as Unesco Reports in Marine Sciences No. 16;
(iii) Workshop on Research and Training Priorities for Coral Reef Management, convened at Manila, Philippines, May 1981 (in conjunction with the Fourth International Coral Reef Symposium). The report of this meeting is published as Unesco Reports in Marine Sciences No. 17;
(iv) International Symposium on Coastal Lagoons, convened at Bordeaux, France, September 1981. The report of this meeting is under preparation;
(v) advisory activities by the SCOR/Unesco Working Group on Mangrove Ecology, and of the SCOR/IABO/Unesco Working Group on Coastal-Offshore Ecosystems Relationships.

Planned for 1982-1983 are a seminar on the scientific aspects of the traditional utilization of coastal lagoons, and an international colloquim on the interdependence of coastal ecosystems.

Besides the above-mentioned reports, the following recent and scheduled publications relate to the project activities in the Asia and Pacific region:

(i) Coral reefs: research methods. Unesco monographs on oceanographic methodology No. 5. Unesco 1978;
(ii) Biogeochemistry of estuarine sediments. Proceedings of a Unesco/SCOR workshop held in Melreux, Belgium, 29 November-3 December 1976. Unesco 1978;
(iii) Unesco regional seminar on human uses of mangrove environment and management implications, held at Dacca, Bangladesh, 4-8 December 1978. A synthetized volume of the scientific presentations (in preparation). The report and recommendations of this meeting are published as Unesco Reports in Marine Sciences No. 8 Unesco 1979;
(iv) Bibliography on mangrove research 1600-1975. Unesco 1981;
(v) Proceedings of the 'Asian symposium on mangrove environment: research and management', held at Kuala Lumpur, Malaysia, 25-29 August 1980. (In preparation by the University of Malaya);
(vi) Mangroves: research methods. Unesco monographs on oceanographic methodology. (In preparation by the SCOR/Unesco Working Group on Mangrove Ecology).

Background information: preliminary activities started in the various regions at different times during the preceding decade. They were structured in the major interregional project during 1979. At its twenty-first session the General Conference adopted resolution 2/01 which endorses under item (h) the present project.

Organizational machinery: Unesco executes, through its regular programme, the initial project activities, together with the institution concerned in the participating Member States, and in co-operation with other United Nations organizations having interests in this field. Scientific input is received from the international community through co-operation with various bodies of ICSU (International Council of Scientific Unions). Examples are: (i) SCOR/Unesco Working Group on Mangrove Ecology, and (ii) SCOR/IABO/Unesco Working Group on Coastal-Offshore Ecosystem Relationships. After field programmes have been developed for the various regions, they are submitted for extra-budgetary funding. UNDP has approved the 'Training and Research Pilot Programme on the Mangrove Ecosystems of Asia and Oceania'. Further details on this programme are given in Part II below.

Participating countries: the majority of coastal Member States in the Asian and Pacific region participate in one way or another in the COMAR project activities.

B. ACTIVITIES AT REGIONAL LEVEL

1. Title: Development of national and regional infrastructure in the marine sciences in Asia and Oceania.

Brief description: the activities of this programme are various: exchange of scientists, consultant advice on manpower, training and research aiming at the development of new projects; provision of fellowships, study and travel grants; training courses, workshops; assistance in strengthening marine science curricula; provision of books and equipment; etc.

Principles of action: many coastal states are exploiting their marine and coastal resources in various ways (e.g. fishing, mining, tourism) without having sufficient capabilities in the marine scientific and technological fields to ensure the optimum long-term use of these resources, both from a socio-economic as well as environmental point of view.

Main aim: to assist Member States in developing or strengthening the training, education and research in marine science and technology in order to increase local capabilities for better understanding and controlling problems that are or are likely to be caused by the multiple uses of the marine environment.

Specific activities and achievements:

(i) arrangements for fellowships and grants, advice to Member States by staff members and consultants, exchange of scientists, etc;
(ii) marine science education project in Thailand, This five-year Unesco/UNDP project (THA/78/021) started in 1979, and contributes-besides to the creation of a centre of excellence in physical and chemical oceanography training and research at the Chulalongkorn University-to an increased capacity to monitor, control and ultimately predict and eliminate levels of coastal pollution, and improving the living standards of shore-line artisanal fishermen;
(iii) introduction since 1979 of the Open University/Unesco Audio-Visual Course in Oceanography into the Curriculum of the Department of Marine Sciences, Chulalongkorn University, Bangkok. Preparations are under way for the introduction of the same course into the curriculum of the Department of Meteorology and Oceanography of the University of the Philippines, Quezon City;
(iv) Unesco/IOC Training Course in Biological Oceanography for the Western Pacific (the study of tropical marine shallow water ecosystems), was organized at the University of San Carlos, Cebu City, Philippines, in March/-April 1981 for twenty participants from nine Member States in the Western Pacific region;
(v) development of marine sciences teaching and research project at Moulmein College, Burma. This Unesco/UNDP project (BUR/74/017) aims at, among others, training aquaculture scientists and technicians; strengthening education in various marine science disciplines; execution of research activities. This project started in July 1981 and will last for over two years.

Participating countries: the majority of coastal Member States in the Asian and Pacific region participate in one way or another in the activities carried out under this programme.

2. Title: Training and Research Pilot Programme on Mangrove Ecosystems in Asia and Oceania (sponsored by UNDP).

Brief description: this integrated, interdisciplinary regional training and research programme on the mangrove ecosystem for Asia and Oceania was developed since 1975 through various meetings, workshops, consultant missions, research and travel grants, etc. The operational Unesco/UNDP programme activities start in 1982.

Principles of action: mangroves were until recent years considered of little value and hence neglected by scientists and policy-makers. This also caused the disappearance of mangrove forests in many coastal states. However, fish, shrimps and molluscs are the main source of animal protein in the diet of most countries of Asia and Oceania, and especially of the poorer sections of their populations. Therefore maintaining the productivity of the coastal zone ecosystems is of paramount importance, and here the mangrove ecosystems play a dominant role. Policies, legal instruments and practical means for their implantation, leading to the conservation and rational exploitation of the mangrove ecosystem need to be developed on the basis of sound research data.

Main aim: the present project is designed to obtain some of the required research data, but more significantly it will train a considerable number of scientists, mangrove zone managers and policy-makers, who will be able to carry on the necessary research and establish the necessary management schemes in the participating countries.

Specific activities and achievements: the final steps in the development of this programme were the 'Asian Symposium on Mangrove Environment: Research and Management', and the meeting of National Mangrove Committees, convened at the University of Malaya, Malaysia, August 1980. The proceedings of the symposium are published in co-operation with the University of Malaya, Kuala Lumpur.

Organizational machinery: each participating country will appoint a national project leader. A reginal task force will be established and will be composed of the national project leaders. The regional task force will assert the project coordinator, in liaison with the National Mangrove Committees, in the implementation of this project. The task force will maintain a focus on regional aspects of the mangrove ecosystems problems, utilizing research data from the Unesco major interregional project referred to under Part I above and other information obtained in other regions in so far as it is relevant to the Asian, Southeast Asian and Pacific mangrove ecosystems.

Participating countries: the following countries are likely to participate in the project: Bangladesh, India, Thailand, Malaysia, Indonesia, Papua New Guinea, Australia, the Philippines, Pakistan, Sri Lanka, Singapore.

Reference of the project: UNDP/79/002.

SECTION X
Science, Technical and Vocational Education

1. Title: International Exchange of Ideas and Information on Science and Technology Education (mathematics, integrated science, biology, chemistry, physics, nutrition, health and home economics) as well as Environmental, Technical and Vocational Education.

Brief description: organization of conferences, meetings and workshop on science and technology education; preparation and dissemination of bibliographical materials and reference documents on science and technology education; technical and financial support for the publication of international newsletters and case-studies.

Principles of action: conferences, workshops, case-studies, advisory and consultive services including financial assistance.

Main aims: better knowledge of new requirements in respect of science and technology education:
- encourage exchange of ideas and information on research concerning science and technology education (including environmental nutrition, health and home economics education) as well as technical and vocational education;
- increase capability of Member States to develop their science and technology education, especially through improved training opportunities for key personnel.

Specific activities and achievements

Meetings:
- International Conference on Science and Technology Education for Development (23 November--2 December 1981);
- expert meeting to review and assess Unesco activities on the exchange of ideas and information on teaching of science and technology;
- symposium to review ways and means to incorporate environmental education dimension in school curricula and teacher training;
- expert meeting on Unesco's future programmes in environmental education.
- financial assistance to various international commissions on science education in organizing meetings as well as planning, publications and distribution of newsletters in different science disciplines.

Publications and studies:
- Studies in Mathematics Education, Vol. 2 (1981) and Vol. 3 (1982);
- New Trends in Primary School Science Education (1982);
- Sourcebook on Teaching School Chemistry (1981);
- New Trends in Physics Teaching, Vol. IV (1982);
- Sourcebook on Out-of-School Science Education (1983);
- New Trends in School Science Equipment (1981);
- New Trends in Nutrition Education;
- Information Bulletins on Innovations in Technical Education;
- Directory of Selected Research and Teacher Training Institutions in the Field of Technical and Vocational Education.
- Directory of Environmental Education Institutions and Programmes.
- Directory of Environmental Education Periodicals;
- 'Connect' - Environmental Education Newsletter;
- Survey on Environmental Education.

Training:
- International Training Course in Environmental Education.

Background information: 21 C/5 Approved, objectives 4.4, 5.8 and 7.7.

Participating countries: different countries including some from Asia.

2. Title: Co-operation with Member States for implementation of the Revised Recommendation concerning Technical and Vocational Education.

Brief description: it deals with objectives, policy, planning and administration of technical and vocational education as

part of general education as well as preparation for an occupational field, etc.

Principles of action: case and comparative studies; meeting, reporting and procedures on implementation and advisory services.

Main aim: to co-operate and help Member States in implementing revised recommendations.

Specific activities:
(i) expert meeting on implementation of the revised recommendation;
(ii) preparation of guidelines for studies on policy (including access of women), planning, administration and cost efficiency of technical and vocational education;
(iii) preparation of a draft study on reporting procedures on implementation of the revised recommendation.

Background information: 21 C/5 Approved, objective 5.8 and Revised Recommendation concerning Technical and Vocational Education (adopted by the General Conference of Unesco, 1974).

3. Title: Improvement of Content, Methods and Materials for Science, Environmental, Technical and Vocational Education.

Brief description: development of teaching, learning materials and techniques for teaching science (integrated science, biology, chemistry, physics, mathematics, nutrition, health and home economics, environmental technical and vocational education (including out of school education).

Principles of action: financial assistance to national and international organizations for the development of the said materials and methods; research studies applied to science and technology education; making available to Member States technical knowledge, information and materials.

Main aims: to improve the learning/teaching of science and technical subjects in and out of school education systems; making available to Member States knowledge, information and materials on science and technology education, environmental education and technical and vocational education.

Specific activities:
- contracts with educational organizations (including science teaching equipment and methods);
- establishment of a bank of illustrations for technical and vocational education;
- preparation of guide for organization of production units;
- case-studies on organization of productive work in technical and vocational education;
- experimentation of technical drawing course for general education;
- studies on non-formal environmental education;
- teacher's manual in environmental education;
- source-book on formal environmental education;
- source-book on non-formal environmental education;
- publication of interdisciplinary prototype modules in environmental education;
- publication of teacher-training modules in environmental education.

Background information: 21 C/5 Approved, objectives 4.4, 5.8 and 7.7.

B. ACTIVITIES AT REGIONAL LEVEL

1. Title: Regional Co-operation on Science and Technology Education (including mathematics, nutrition, health and home economics) as well as Environmental, Technical and Vocational Education.

Brief description: the Regional Office for Education in Asia and the Pacific (ROEAP) is to intensify its efforts in preparing and disseminating the regional newsletter and bibliographical materials on science and technology education activities to be carried out through the Asian regional network of educational innovation of development.

Principles of action: promotion of pilot/experimental projects, training programmes and development of science curricular materials and equipment etc. for science and technology education. Financial assistance for workshops and development of curricular materials; consultative and advisory services.

Main aims:
- improvement of science and technology education; environmental education and technical and vocational education;
- exchange of ideas and experience in the above fields;
- development and dissemination of teaching/learning materials in the above fields.

Specific activities:
(i) financial assistance to the Asian Association for Biology Education to organize a conference on the role of biology education in enhancing the quality of life;
(ii) support for the convening of the Second Southeast Asian Conference on Mathematical Education (21-24 April 1981); 300 participants from twenty countries attended;
(iii) Regional Conference on Environmental Education Transfer in Asian Universities (September 1981);
(iv) pilot project on technology in general education with participation by India, the Philippines, People's Republic of China and Australia to develop teaching materials for interlinked science and technology education;
(v) preparation of a comparative survey of the system and methods to incorporate environmental education into pre- and in-service training of teachers;
(vi) training workshops in science and technology education, including mathematics and education in respect to nutrition, health, home economics and environment;
(vii) training activities in design and development of science equipment;
(viii) Asian subregional mobile seminar for technical teacher educators;
(ix) development of supplementary teaching-learning materials for the popularization of science in Asia;
(x) development and publication of a handbook for teaching of biology in Asian schools;
(xi) development of a manuscript on physiology of man in the Asian tropics.

Participating countries: different countries in the region.

Background information: 21 C/5 Approved, objectives 4.4, 5.8 and 7.7.

C. ACTIVITIES AT NATIONAL LEVEL

Title: Improvement of Content, Methods and Materials for Science and Technology Education (mathematics, integrated science, biology, chemistry, physics, nutrition, home economics and health) as well as Environmental, Technical and Vocational Education.

Principles of action: support for:
(i) organization of workshops, meetings and training courses at national level;
(ii) development of teaching/learning materials (including audio-visual aids, etc.).

Main aim: improvement of learning-teaching of science and technology in the context of local socio-cultural patterns, as well as its popularization in the general public.

Specific activities:
(i) support for the preparation and organization of a national training workshop on environmental education in China;
(ii) development of booklets on teaching of ecology and genetics (Malaysia and the Philippines);
(iii) development of manuscripts on rearing and caring of children (India, Philippines, Malaysia, Pakistan);
(iv) development of modules in mathematics education for teacher training (India);
(v) preparation of an experimental module for in-service training of science teachers and supervisors in environmental education at primary level (India and the Philippines);
(vi) pilot project on environment education with special reference to marginal urban areas in India;
(vii) preparation of an experimental module for the pre-service training of science teachers and supervisors in environmental education in secondary schools (Australia);
(viii) preparation of curricular materials for home economics education in the Philippines;
(ix) provision of advisory and consultancy missions in Asian countries;
(x) contributions to the bank of technical illustrations for technical and vocational education at the pre-university level will be sought from different Member States in Asia;
(xi) case-study on the organization of productive work in technical and vocational education (Indonesia);
(xii) experimentation with the technical drawing course for general education (developed by Unesco) will be conducted in South Korea, India, Sri Lanka, China and the Philippines.

Background information: 21 C/5 Approved, objectives 4.4, 5.8 and 7.7.

SECTION XI
Statistics on Science and Technology

A. ACTIVITIES AT WORLD LEVEL

Title: Statistics on science and technology

Principles of action: activities of the Office of Statistics in this field are based essentially on the following principles:
(i) statistics on science and technology constitute useful management tools for the assessment, policy-making, planning, evaluation and control of the development of scientific and technological activities, which in turn contribute to the general economic growth and social progress;
(ii) internationally comparable science statistics can be used at the national level to indicate the relative position of the country in comparison with other countries and consequently aid in national science policy-making. At the international level, by revealing the imbalance in the distribution of world resources devoted to scientific and technological activities, and by facilitating the identification of areas likely to be of interest for some common actions, they serve to promote international co-operation in this field.

Main aims and functions:
(i) improvement of methods for collecting, processing and presenting statistical data;
(ii) amelioration of the international comparability of data by establishing international statistical standards and promoting their implementation;
(iii) continued expansion of the scope of the international collection of science statistics, which has so far been limited to R&D, to encompass other aspects of scientific and technological activities such as scientific and technological information and documentation (STID) and scientific and technological education and training (STET);
(iv) co-operation with Member States to develop their science statistical capacity and infrastructure;
(v) collection, analysis and dissemination of statistical data.

Specific activities:
(i) with a view to improving the scope, accuracy and reliability of basic data, undertaking of methodological studies and preparation of practical guides and manuals for data collection; advice to national statistical services on survey methodology and on the application of basic international concepts;
(ii) establishment of international standard classifications in statistics on science and technology. Publication and distribution of a manual which incorporates these standards, to national bodies in charge of the collection of science statistics. Holding of regional seminars to present the international methodology and to train national specialists in statistics on science and technology;
(iii) expansion of the scope of international statistics on science and technology to cover, apart from research and experimental development (R&D) activities, also scientific and technological information and documentation (STID) and scientific and technological education and training (STET), at broadly the third level, by setting up the conceptual framework and the fundamental international methodologies and standard classifications;
(iv) assistance to Member States in the form of advisory missions, pilot projects and regional seminars, with the intention of building up their science statistical capacities and harmonizing their national practices with the international concepts;
(v) maintaining and developing co-operation with other United Nations agencies as well as intergovernmental organizations such as the CMEA, EEC, OAS and OECD;
(vi) systematic collection of data concerning qualified manpower and human and financial resources devoted to R&D. Pilot surveys on scientific and technological information and documentation (STID) and scientific and technological education and training (STET). Preparation and dissemination of analytical study reports, methodological papers, and special regional studies undertaken in connection with international or regional ministerial conferences (UNCSTAD, CASTALA, CASTASIA, CASTARAB). Methodological studies on the estimation of missing data and projections of qualified manpower potential. Exchange of information by means of the annual publication of the 'Annotated accessions list of studies and reports in the field of science statistics'.

Principal achievements:
- publication of comprehensive worldwide statistics on R&D in the Unesco Statistical Yearbook, the United Nations Statistical Yearbook, and in studies published under the Current Surveys and Research (CSR-) series of the Unesco Office of Statistics;
- as a follow-up to the adoption by the twentieth session of Unesco's General Conference of the Recommendation concerning the International Standardization of Statistics on Science and Technology, preparation and publication of the

Provisional Manual for Statistics on Scientific and Technological Activities, which has been distributed to national and territorial authorities for comments and implementation;

- holding of three regional training seminars in New Delhi, Caracas and Rabat, for specialists from Asian, Latin American and Arab States respectively. Three more such seminars are planned to take place during the period 1981-1983, of which two will be held for the African region and one for Latin America and the Caribbean. An had hoc national workshop on the application of Unesco international standards took place in Beijing (Peking), China. Similar advisory services will be provided on the occasion of staff missions;
- in preparation of the collection of statistics on scientific and technological information and documentation (STID), the basic conceptual framework and preliminary methodology conceived by Unesco have been field-tested in Sudan, Poland, Australia and Mexico. The results obtained are being analysed and synthesized for use as input into the preparation of a preliminary guide to STID statistics and improvement of the design of the survey questionnaires. Pilot surveys applying this methodology will be held in selected countries. Based on the result of these pilot surveys, the final basic international methodology for the collection of statistics on scientific and technological information and documentation (STID) will be established and disseminated to all Member States for application. In the long run, the Unesco Office of Statistics will provide direct technical assistance to countries intending to launch STID surveys, through advisory missions and national seminars. It can be envisaged that the next round of regional seminars on science statistics includes also STID statistics;
- efforts in harmonizing existing national practices in the collection of statistics on science and technology are being increased. So far, comparative studies of methodologies adopted by a number of Latin American countries such as Argentina, Brazil, Chile, Colombia, Cuba, Mexico, Peru, Uruguay and Venezuela, have been completed. Similar studies will be extended to other regions of the world. The ultimate goal is to be able to advise Member States in the future on how to converge their principal methodologies to a uniform international one, based on the result of these comparative studies;
- publication of analytical studies, reports and selected international statistics on science and technology in the series 'Current Surveys and Research (CSR-) in Statistics'. Contribution in the supply of statistics to UNCSTD and various regional intergovernemental conferences and meetings such as the MINESPOL II, etc. Annual publication of the 'Annotated Accessions List of Studies and Reports in the Field of Science Statistics'.

Background information:

- programme launched in the early sixties based on the resolutions adopted by the General Conference of Unesco which authorize the Director-General to collect, analyse and disseminate statistical information relevant to Unesco programmes in education, science and culture, to promote international comparability, to improve statistical methodologies, and to co-operate with Member States in the development of their related statistical services and infrastructure;
- 21 C/Resolution 5/10.2;
- Unesco's Medium-Term Plan for 1977-1982, objective 10.2.

Organization responsible: Unesco, Office of Statistics.

Organizational machinery: Unesco's General Conference, Executive Board and Secretariat.

Participants: all Member States of Unesco, particularly the national bodies responsible for statistics on science and technology; international, intergovernmental and regional organizations dealing with science statistics such as the OECD, CMEA and OAS.

B. ACTIVITIES AT THE REGIONAL LEVEL

A regional training seminar on statistics on science and technology was held in New Delhi, India, in March 1980, with fourteen participants from nine Asian countries.

Pilot projects will be undertaken in a number of countries in Asia and the Pacific for the purpose of helping them to develop their data collection systems.

C. ACTIVITIES AT THE NATIONAL LEVEL

An ad hoc national workshop took place in early September 1981 in Beijing (Peking), China, where the basic Unesco international standard classifications in science statistics were presented, followed by discussions on how to improve the convertibility of the Chinese national categories into the Unesco categories, as well as on possible future expansion in the scope of data collection in China, along the line of Unesco's international methodology.

Similar ad hoc advisory services on science statistics will be provided at the request of national authorities on the occasion of future missions of staff members.

Advisory and fact-finding missions.

SECTION XII
Scientific and Technological Information

General introduction: the promotion of co-operation in the field of information is one of the major objectives of Unesco. The General Information Programme, an intergovernmental programme which includes UNISIST (a conceptual framework for co-operation in matters dealing with scientific and technological information) is responsible for activities carried out by the Organization and which concern documentation, library and archives services and specialized information systems.

These activities are designed to make information available to a great number of users and to facilitate its application to development.

Thus, one of the objectives of the General Information Programme is to promote information at all levels and in all sectors and to meet users' needs, particularly in developing countries.

It is within this framework that the General Information Programme's action oriented towards Asian countries should be understood; it is worth adding, before presenting particular objectives and achievements concerning these countries, that general activities undertaken to meet the needs of the scientific community, such as the elaboration of methods, norms and standards relating to the processing of information concern all disciplines-including science and technology-and can also be conducted at the regional as well as the national levels.

A. ACTIVITIES AT WORLD LEVEL

1. Title: Promotion of services for selective dissemination of information (SDI).

Brief description: Unesco is promoting the development of SDI services in interested Member States as a means of improving access to scientific and technological information.

Principles of action: assistance is provided in the form of advice, software and training. In the case of requests from developing countries, effort is made to provide financial support through the regular and participation programmes or extrabudgetary sources. The CAN/SDI package developed by the National Research Council of Canada is made available free of charge as part of the overall CDS/ISIS-CAN/SDI package administered by the Library, Archives and Documentation Services of Unesco.

Main aims: the main aim is to help establish SDI services in Member States. Special emphasis is given to services which can perform a regional role.

Special activities:

(i) the SDI service of the Indian Regional Documentation Centre (New Delhi) will be expanded in the next five years to include 9,000 users and nine data bases in science and technology. The service was initiated as a Unesco pilot project (1974-1977) and Unesco will provide assistance in updating and improving its computer operations in 1981;

SDI services at the Asian Institute of Technology (Bangkok) and the Universiti Pertanian Malaysia (Penang), have become operational in 1981 with Unesco assistance;

(ii) a guide for the establishment and evaluation of services for the selective dissemination of information (Paris, Unesco, 1980, PGI/80/WS/14) is available through the General Information Programme.

Pilot activities 1974-1977: general availability of CAN/SDI to Member States since 1978.

Organizations responsible: national and institutional authorities with Unesco assistance.

Participating countries: India, Malaysia, Thailand.

Background information: 21 C/5, paragraph 5069.

2. Title: Study of present and potential strategies for use of telecommunications for information transfer.

Brief description: a pilot study will be undertaken in a Member State in Southeast Asia (along with a companion study in another region) to analyse the present national situation with respect to telecommunications infrastructures, the demand for national and international data communications, and the plans relating to development of public data communications channels for information transfer.

Principles of action: a two-week consultant mission will be fielded to conduct the study in late 1981.

Main aims and specific activities: to provide recommendations on a model for linking information sources and user organizations at the national level, on priority areas at the national level, and on options for regional and international co-operation in data communications.

(i) Advisory mission to take place in 1981.
(ii) Report to be prepared in 1982.

Background information: the potential importance of telecommunications in improving access of the developing countries to scientific and technological information was emphasized in the Action Plan of UNCSTD (1979) and has been reiterated in regional consultations.

Organizations responsible: Unesco, in close consultation with the national authorities and the International Telecommunication Union (ITU).

Participating countries: a Member State in Southeast Asia (preliminary negotiations have been initiated with the Indonesian authorities).

3. Title: Pilot project on the consolidatin of information relating to new and renewable energy sources.

Main aims and specific activities: the project aims at developing a methodology for the evaluation and condensation of information on new and renewable energy sources for application in research and development. The first phase of the project is confined to information relating to biogas, windmills and cooking stoves.

Principal achievements: the following publications have been produced: Biogas Programmes Directory; Directory of Indian Energy Contacts; a bibliography on solid fuel cooking stoves and an international directory on solid fuel cooking stoves; Wind Energy Programmes Directory. These and other sources of information will be used to produce evaluated state-of-the-art publications in the three selected fields (biogas, windmills, cooking stoves).

The project continues through 1983 with the coverage of additional subjects for consolidation and with field tests for measuring user reaction to the finished products.

Organizations responsible: the project is being implemented under a contract established with the Data Energy Research Institute, Bombay.

Participating country: India.

4. Title: International Databank for the Non-Aligned Countries (IDNAC).

Brief description: a data bank to be set up in Colombo to provide on-line access to information:

(i) relating to the Non-Aligned Movement;
(ii) necessary for the social and economic development of the Non-Aligned Countries.

Principles of action: following a preliminary study by a Unesco staff member (An International Databank for the Non-Aligned Countries, PGI-80/WS/30), a feasibility study is being carried out by five consultants and will be concluded in December 1981. Financing will then be sought for implementation with the host government providing the local inputs.

Main aims: to provide a centre to house the documentation produced by the Non-Aligned Movement and other related information. To be a source of information and data not normally available from existing international information sources on a non-profit-making basis, and of particular relevance to the needs of the developing countries.

Specific activities and achievements: information services for developing countries and other users (when project is launched).

Phase I has commenced and is concerned with identification and collection of documentation on the Non-Aligned Movement and the establishment of a documentation and information centre. Phase II will be launched after consideration of the Feasibility Study Report, perhaps in 1982.

Organizations responsible: Unesco and the Government of Sri-Lanka on behalf of the Non-Aligned Countries.

Organizational machinery: the Ministry of Foreign Affairs, Sri Lanka, in collaboration with other relevant ministries and organizations in the country.

Participants: all members of the Non-Aligned Movement (approximately 93 Member States and Freedom Movements).

Reference of the project: the feasibility study has been assigned UNDP project number RAS/79/138.

5. Title: Development of National Focal Points and National Information Committees.

Brief description: the Intergovernmental Council of the General Information Programme and its Bureau reflected on several occasions on the need to improve the functions and performance of the National Focal Points (FP) and National Information Committees (NC).

To this date, fourteen (Australia, Bangladesh, China, India, Indonesia, Iran, Korea, Nepal, New Zeland, Pakistan, the Philippines, Sri Lanka, Viet Nam, Thailand) out of twenty-nine Asian countries, have established such bodies, all of which are not equally active.

Specific activities and achievements: several research projects and guidelines involve or refer to activities in various Asian countries.

6. Title: Science and Technology Information: Analytical Case-Studies.

Brief description: eight case-studies in the provision and use of science and technology information.

Principle of action: each country was visited by an independent expert working in close co-operation with a nationally appointed liaison officer.

Main aims:

(i) to diagnose the needs and study the available options for information provision and use in developing countries;
(ii) to foster a better understanding of the nature of both needs and options;
(iii) to build up a greater capabilities for developing suitable plans and policies;
(iv) to identify more clearly the various actions the organizations of the United Nations system could undertake to promote the improvement and better use of information.

Specific activities and achievements: the first findings of the study were made available to the Intergovernmental Committee on Science and Technology for Development at its third session held in New York from 27 May to 5 June 1981.

Background information: as a result of the United Nations Conference Science and Technology for Development (1979), the United Nations Interim Fund for Science and Technology for Development and Unesco launched the first phase of an investigation.

Participating countries: the eight case-study countries were Colombia, Costa Rica, Jordan, Kenya, the Republic of Korea, Malaysia, Morocco and Nigeria.

Reference: GL/81/ST02.

B. ACTIVITIES AT REGIONAL LEVEL

1. Title: Postgraduate training course for science information specialists in Southeast Asia.

Brief description and aims of the programme: the principal long-range objective of the project is to strengthen and expand scientific and technical information systems and services of the countries in Southeast Asia. The immediate objective is to establish a postgraduate training course to develop a cadre of professional staff for such systems and services. Many participants are expected to return to their countries as teachng staff, contributing to the training of professionals at the national level.

Specific activities and achievements: a nine-month regional postgraduate training course for scientific information specialists, leading to a diploma, was established and conducted regularly at the University of the Philippines. In 1981 a programme leading to a Master's degree was introduced.

A project-co-ordinator/lecturer was assigned to the course and consultants are lecturing on special topics. About twenty fellowships (Bangladesh, Burma, China, Indonesia, Malaysia, Nepal, Pakistan, Sri Lanka, Thailand, etc.) are awarded yearly by UNDP and Unesco, and students of Philippine nationality benefit from financial assistance.

Equipment, including a microprocessor, teaching kits, a minibus, etc. was, or is being purchased for the course. Former students were trained to become lecturers and faculty members benefit from study grants to upgrade teaching methods and allow the introduction of special topics.

Background information: the project started in 1978 and after a gradual takeover by the University of the Philippines, it will terminate in 1978. The project is hosted by the University of the Philippines, Manila.

Participating countries: this is an inter-country project of the governments of China, Indonesia, Malaysia, the Philippines, Singapore and Thailand. Other countries from the region also benefit from the course if places are available.

Reference: RAS/75/034.

2. Title: Technical support to the ASEAN secretariat.

Brief description and aim: this project is in the field of science with a subproject under the responsibility of the Division of the General Information Programme. The aim of this subproject is to plan the organization of the Documentation Centre of the ASEAN secretariat; to train its staff and to purchase equipment.

Reference: RAS/78/038.

3. Title: Regional Seminar on the Application of Standards in Information.

Specific activities and achievements: the seminar was held in Manila from 9 to 13 February 1981; the following major subjects were covered:

- aims, problems and organization framework of standardization in information;
- the role of international organizations in standardization;
- standards for the design and development of computer-based information systems, for systems interconnection, for telecommunication, for reproduction of documents and documentary languages.

Organizations responsible: organized under Unesco contract (regular programme) by the Institute of Library Science/ University of the Philippines.

Organizational machinery: in the framework of the UNDP Postgraduate Training Course for Science Information Specialists in Southern Asia.

Participants: in addition to the thirty postgraduate course participants, another ten specialists from Thailand, China and the Philippines attended the seminar.

4. Title: Regional Centre for the International Serials Data System in Southeast Asia (ISDS-SEA).

Brief description: Unesco is financing a pilot project (regular programme) on the establishment of a union list of international serials held in the libraries of Southeast Asia.

Background information: this centre was established in 1978 with the participation of the Philippines, Indonesia, Singapore, Malaysia and Thailand.

Organizational machinery: the regional centre, which is located at the National Library of Thailand in Bangkok, is responsible for the collection and processing of information on serials published in the five participating countries.

5. Title: Regional Workshop on the Use of Computers in Cataloguing.

Main aim: to brief participants on the use of computers in cataloguing with particular emphasis on MALMARC developed for Malaysian institutions.

Organization responsible: Universiti Sains, Malaysia, Penang.

Participants: twenty-five participants from Indonesia, the Philippines, Singapore, Thailand and Malaysia.

6. Title: Regional Training Course on Management Principles and Techniques for Information Centre Managers.

Brief description: devoted to analysing the problems faced by managers of information centres in the developing countries of South and Central Asia with particular reference to the Indian experience.

Specific activities: organized from 29 December 1980 to 10 January 1981 in New Delhi.

Organizations responsible: National Information System for Science and Technology (NISSAT) in association with Unesco and Unesco's Regional Office for Science and Technology in Southeast Asia (ROSTSEA).

Participants: twenty-five participants from South and Central Asia.

7. Title: Training course on archives administration for participants from the Pacific area.

Main aims: to provide participants with a basic introduction to modern archives administration, including basic records management.

Specific activities and achievements: the training course was in October 1981, in Suva, Fiji.

Organizations responsible: International Council of Archives in close co-operation with Unesco.

Participants: open to twenty-five to thirty participants responsible for the archives of governments of the Pacific Islands.

8. Title: Regional Seminar on Audio-Visual and Computer-Assisted Instructional Aids in Library and Information Science Courses.

Main aims: to provide about twenty teachers of library and information science form Asian schools with an opportunity to discuss experiences and exchange ideas on the possibilities of developing audio-visual and computer-assisted teaching aids and suggest ways of co-operation in this field.

Specific activities and achievements: the seminar was held in November 1981 in the Philippines.

Organizations responsible: Institute of Library Science of the University of the Philippines in association with the Unesco National Commission and Unesco.

9. Title: Three-month Library Internship Programme for Southeast Asian Library School Faculty Members.

Main aim: to help library schools teachers in bridging the gap between theory and practice in modern librarianship through an individually designed intensive training programme in a real library environment.

Specific activity and achievement: the internship was held from 15 September to 15 December 1981. Two internships available for 1981.

Organizations responsible: Ohio University Libraries, United States of America.

10. Title: Directory of Information Analysis Centres.

Brief description: compilation of a directory of operational information analysis centres in science and technology.

Main aims: to provide information on operational information analysis centres giving descriptions of the services provided, their publications, etc.

Specific activities: carried out under contract by a Unesco consultant.

Background information: the work will be completed in June 1982 and was undertaken following a recommendation of the Second UNISIST Working Group on Information Analysis and Consolidation.

11. Title: Standing Working Group on Regional Information Activities in South and Central Asia.

Brief description: a consultant was assigned in 1981 to initiate a feasibility study for the establishment of a regional information network.

Activities and achievements: a report was submitted to the Secretariat in May 1981.

Background information: part of the activities carried out in co-operation with Unesco's Regional Office for Science and Technology in South and Central Asia (ROSTSCA) since 1974 relating to the development of a regional network and as a follow-up action to a meeting of experts on regional information development and planning (New Delhi, 1979) (21C/5, paragraph 5049, Action 2 (d)).

Participants: the following countries were surveyed: India, Nepal, Bangladesh, Sri Lanka, Pakistan and Iran.

12. Title: Regional Participation Programme Requests Approved for 1981-1983.

Brief description: the Fifth Congress of Southeast Asian Librarians (CONSAL V) Request No. 8253-Financial Assistance. CONSAL, which was established in 1970 as a means for exchange of ideas and information on libraries, is convened at least once every three years in the region.

Main aims: examine state of the art in Southeast Asia in access of information and to recommend the formulation of national information policies.

Achievement: holding of a conference.

Participants: ASEAN Member States as official participants, other Asian countries as observers.

C. ACTIVITIES AT NATIONAL LEVEL

Country: *Australia*

Title: Statistical data project.

The methodological approach towards the collection of data on statistics on scientific and technological information and documentation was field tested in 1981.

Achievement: the final report was submitted to the Secretariat in April/May 1981.

Background information: 21 C/5, paragraph 5050.

Country: *China*

Title: Development of the Institute of Scientific and Technological Information of China (ISTIC).

Brief description: assistance is being provided to ISTIC in Beijing for the development of its information services and facilities.

Principles of action: advice and training are being provided on certain priority aspects of ISTIC's development, with a view to facilitating further international assistance as may be required.

Main aims: to assist the national authorities in preparing a plan for the development of computerized information services in science and technology, in setting up initial information activities and in training essential manpower to begin implementation of the plan.

Specific activities and achievements:

(i)
- overall advisory mission in 1980 followed by agreement with the national authorities on further action (RP);
- training course on information retrieval and system design foreseen in 1982 (RP);
- travel grant for planning a national information service on research in progress foreseen in 1982 (RP);
- assistance in preparing and implementing a UNDP-assisted project for development of computer operations and interfaces to be considered for initiation in 1982;

(ii) the report of the 1980 advisory mission on the development of ISTIC is to be made available to interested Member States and organizations by Unesco.

Organizational machinery: national authorities with advice from Unesco.

Background information: 21 C/5, paragraphs 5068, 5071, 5090.

Country: *Indonesia*

Title: National Seminar on the Application of Standards in Information.

Achievements: the seminar was held in Jakarta in February 1981 and was attended by thirty participants. In addition to the subjects covered in the regional seminar (the Philippines) special emphasis was given to the application of standards for the interchange of machine-readable bibliographic data and its computerization aspects. The seminar was organized under Unesco contract (regular programme).

Organization responsible: Indonesian National Scientific Documentation Centre (PDIN).

Country: *Malaysia*

Title: Pilot project on the use of university libraries by users who are not members of the university.

Brief description: services that university libraries can give to users who are not members of the university.

Principles of action: financial assistance.

Main aim: the purpose of the project is to explore to what extent university libraries can give services to users outside the university without threatening services to the university community itself.

Specific activities and achievements: the project is being implemented in Universiti Sains Malaysia (USM), Penang, and Universiti Pertanian Malaysia (UPM), Kuala Lumpur.

(i)
- Feasibility studies (UPM and USM);
- staff mission for negotiation of the project (March 1980);
- surveys of the information needs of prospective users (UPM and USM);
- training in indexing and information repackaging (UPM);
- distribution of agricultural newsletter (UPM);
- launching of SDI service (USM).

(ii) Possible publication of the surveys of information needs.

Background information: 20 C/5, paragraph 5156. Feasibility studies were carried out in early 1979. Launching of the project in late 1979, to be finished and evaluated in 1983.

Organizational machinery: project administered by a programme specialist in the Section for the Development of Information Infrastructure, Division of the General Information Programme.

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